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"VULCANIZATION WITHOUT SULPHUR."

FROM its inception the world's rubber industry has depended upon sulphur to effect vulcanization. Nor has there been a substitute discovered or invented. Possibly none is now in sight, but the exceedingly interesting experiments conducted by the eminent Russian chemist, Professor I. I. Ostromyslenski, lead one to think otherwise.

The details of the learned professor's experiments and conclusions, although published in the "Journal of the Russian Physicō-Chemical Society," were not available to the English-speaking world. Appreciating this, and alive to the widespread interest on the part of the chemist and rubber manufacturer in such a subject, the "India Rubber Journal" secured an eminent linguist to translate the three papers. This translation they published in full in their issue of September 30. THE INDIA RUBBER WORLD republishes the papers in this issue, and on its own behalf and that of its readers takes this occasion to thank our British contemporary for rendering available this most original and valuable contribution to the literature of india rubber.

CHEAPER SOLVENT NAPHTHA THROUGH ALCOHOL.

WE HAVE but lately called attention to the importance of solvent naphtha in the rubber industry, the enormous quantities consumed, and the significance of the prevailing high cost. Since then, the price of gasolene has been reduced three cents a gallon, but the present 25-cent rate is still virtually double the price of a year ago, so that the matter today is no less vital to proofers and cement makers.

Governmental investigation and new cracking processes may obviate any new price increases for a time, but it is doubtful if they can bring about any very great further reductions. Of course, continued high prices would eventually encourage the production of gasolene from natural gas and also from shales, but such departures take time.

The wider use of industrial alcohol, which has become a certainty of the immediate future, presents the most promising solution of this vital problem. Dr. Arthur D. Little, the eminent chemist, is authority for the statement that there is no longer any question of the manufacture of alcohol on a commercial scale as a fuel for automobiles. Experiments have shown, he claims, that alcohol can be made for 25 cents a gallon, at which price it would be preferable to gasolene. It is cleaner; will not catch fire nor explode; will develop almost as much horse-power as gasolene, and the combustion products are negligible.

According to the Du Pont Laboratory, the production of alcohol from sawdust treated with sulphuric acid in a lined converter and subjected to heat and pressure, has already proved a commercial success. Another process to utilize the fermentable sugars existing in waste sulphite liquors at pulp mills has great future promise. It has been estimated that the proportion of alcohol present is about 1½ per cent, and that enough sulphite liquor now goes to waste to yield an output of 200,000 gallons of alcohol a day. Pure alcohol can be obtained in this way, but other compounds are usually present. Although the process has not in every instance proved successful, due to the high cost of the labor involved, this condition can probably be overcome. Still another important source of alcohol for commercial purposes is suggested by the fact

that about one-seventh of the world's total sugar production annually goes to waste.

The progress and future outlook of industrial alcohol means much to rubber manufacturers in almost every line, for its use in motors will insure cheaper solvent naphtha; indeed, in this respect, will outclass any opening of new petroleum fields or discovery of new cracking processes. It is also predicted that cheap alcohol may make possible the production of synthetic rubber at less than 25 cents a pound—the approximate cost of plantation rubber—a circumstance which, in turn, suggests employing petroleum bases for the same purpose should the market for one of the most profitable petroleum products, gasolene, be lost to alcohol.

THE PERIL OF PEACE.

DEPENDENT as American rubber manufacturers are upon Europe for crude rubber, they face the ever-present possibility of a sudden interruption of the supply. This might take the form of an embargo, because of international or trade differences, or of a virtual blockade of the ports receiving rubber. So far, the trade has been remarkably fortunate. While the war continues it is probable that the same favorable conditions will prevail; but what are the rubber prospects once peace is declared? That economic conditions will be vastly changed cannot be doubted for an instant. The enormous costs of the greatest and most terrible of all wars are certain not only to entail economies, but to create tariffs that will be great in proportion to the needs of the various belligerent countries.

It looks more and more as if free-trade England is turning definitely toward high tariff. Certainly, once her need of foreign-made goods becomes less imperative she is bound to protect home manufacturers, not alone in England proper, but in the great British colonies as well.

Nor is it supposable that with the crude rubber business in her own hands she will long omit to impose an export tax sufficient to be of material assistance in liquidating her immense war debt. Holland, too, has suffered great financial losses through the war, and an export tax on india rubber assessed by English colonies would doubtless be imitated by the colonies of the Netherlands.

Of course, this would stimulate rubber planting and do much for wild rubber besides; but prices would go up and stay up on all grades. It is probable that nothing will be done by America to counteract this tendency. Certainly, our government will not, perhaps cannot, come to the rescue of the trade as England or Germany would under like conditions. It will be recalled, for instance, that America once held the rest of the world in leash with her practical monopoly of cotton growing. To offset it England produced not only Egyptian, but Indian and West Indian cotton. And in this she was wise and right.

American investments in rubber plantations of the Far East, already large, will doubtless have a mitigating influence. What would be far more potent, however, would be American plantations in American territory; not to drive the Far Eastern planter from the field, for he deserves his success and should be protected, but just to keep us from being so wholly, so helplessly dependent.

PENALTY DUTY ON INDIA RUBBER?

THE rubber trade received a disagreeable jolt a day or two ago when the New York "Herald" bureau at Washington outlined the provisions of a recently enacted tariff law. It was a bit of "eleventh hour" work and intended to protect the American dye manufacturers from German competition. As such it contained a provision for "penalty duties on articles imported into the United States under the agreements affecting the purchase of other goods by the importer." According to the "Herald" it is found that the provision "requires the imposition of penalty duties on all dutiable raw materials controlled by the Allies and sold to Americans under restrictions preventing export, etc."

India rubber is purchased under such restrictions and would seem to be subject to penalty duty. At the same time, however, comes the comforting assurance that it was all "a mistake" and that "No concealment was made of the intention to find some way of avoiding the enforcement of the law if that be possible."

OCOTILLO (ALSO KNOWN AS OCOTOLLO AND OCOTELLO) RUBBER, which has set Arizona ablaze, may or may not prove of use in general rubber manufacture. It may go the way of rabbit weed rubber and the seaweed rubber, but even in failure, if failure come, it will point a moral. And that is the wonderful market for American grown rubber or rubber-like gums, a market that will be supplied some way, some day.

ONE OF THE BRIGHT PUBLICITY MEN OF THE GOODYEAR TIRE & RUBBER CO. has spread broadcast, through the daily press, a tale to the effect that the Mexican peons use cast-off Goodyear tires for shoes. It may be true, nor is it for us to doubt it, but is this not a direct infringement? Has not the Goodrich company copyrighted "Barefoot" tires? Or do the peons also wear inner tubes for stockings?

Mechanism of the Process of Vulcanization of Caoutchoucs.

By I. I. Ostromyslenski.

[From the "Journal of the Russian Physico-Chemical Society," 1915, pages 1,453-1,461. Translated from the original Russian by Thomas H. Pope, B.Sc. Translation revised by Dr. H. P. Stevens, published in the "India Rubber Journal," September 30, 1916.]

THE hot vulcanization of caoutchouc discovered by Goodyear (1839) proceeds, as is well known, under simple conditions; a homogeneous mixture of the caoutchouc and sulphur is heated at 130 to 145 degrees. That is all. As a result, the initial caoutchouc loses its plasticity, and separate pieces of fresh fractures no longer exhibit the power of adhesion. The solubility is lowered, and the "interval of elasticity" increased; the fatal temperature of well vulcanized natural caoutchouc lies at about — 35 degrees, that of the chemically pure product being about — 18 degrees. What takes place during the heating of the caoutchouc? Attempts to explain this peculiar process have exhausted all the theoretical possibilities. Some investigators regard it as an exclusively physical process, and others as solely a chemical reaction, whilst many authors consider vulcanization to be determined by both physical and chemical changes.

Since all phenomena, at any rate, of unorganized nature, are divided into only two groups—the physical and the chemical—there can be no essentially new theory of vulcanization. Nevertheless, the nature of the mechanism of the process even yet remains unexplained.

The supporters of Weber's chemical theory regard vulcanized solid caoutchouc (ebonite) as a polymeride of the compound, $C_{10}H_{16}S_2$ (16 per cent of sulphur), whilst others, for instance, Erdmann, consider it to be the thiozoide, $C_{10}H_{16}S_3$, or even a dithiozonide. On the other hand, many identify the vulcanization of caoutchouc with the process of "swelling" (Quellung) of colloids or that of gelatinization or adsorption, that is, with the processes of formation of solid or "semi-solid" solutions, etc.

Some of the supporters of the "mixed" theory consider that the sulphur itself swells or is adsorbed or dissolved in the free caoutchouc, whereas other authors assume the preliminary formation of a compound of the caoutchouc with the sulphur—although only in insignificant amount—this compound being then adsorbed in the still unchanged caoutchouc.

I shall not devote time to the extensive literature of this question, but shall proceed immediately to the conclusions which result from my observations and my new methods for vulcanizing caoutchouc.

Until now no method of vulcanizing caoutchouc has been known in which any organic or mineral compound not containing sulphur is used as vulcanizing agent.* But the chemical and especially the physical theories of vulcanization anticipate the possible existence of a whole series of such compounds. I decided to attempt to find substances which may replace sulphur in the vulcanization of caoutchouc.

It was thought that the investigation of the action of homologues and analogues of such substances on caoutchouc and that of the external conditions of the new process—the influence of different admixtures, accelerators, etc.—might elucidate the mechanism of vulcanization itself.

This task has now been completed, and two new methods for the hot vulcanization of caoutchouc have been discovered.

When heated with unsaturated hydrocarbons, sulphur produces a twofold effect: it combines at the double bond with formation of thiozonides (Erdmann), or it oxidizes the ethylene grouping, removing hydrogen in the form of hydrogen sulphide, a new ethylenic derivative, or a new compound containing sulphur being thus formed.*

On the physical side, sulphur is characterized, besides by the ordinary constants (specific gravity, melting point, etc.), and by its ability to exist in different polymorphic modifications (rhombic, hexagonal, amorphous, etc.).

In searching for organic substances which vulcanize caoutchouc like sulphur, the first to be investigated are those which resemble sulphur in oxidizing ethylenes, and at the same time are able to unite at the double linking. Of the physical constants of such substances the essential ones are the melting point and the vapor pressure at the temperature of vulcanization; after these, the solubility in caoutchouc, specific gravity, etc. Besides possessing physical constants near to those of sulphur, the sought for compounds should exist in polymorphic modifications.

This explains why, in this investigation, I first of all made a halt at compounds containing the nitro-group. These oxidize organic substances (*e. g.*, in Skarup's synthesis of quinoline), and at the same time readily combine with various ethylenes (attention may be called to the compounds of Ar (NO_2) with polycyclic hydrocarbons and to the author's use of tetranitromethane as a reagent for double bonds).

1 : 3 : 5-Trinitrobenzene has a melting point, 118 degrees, very near to that of sulphur, *i.e.*, below the temperature of vulcanization, and in specific gravity it also resembles sulphur. Further, most polynitro-compounds exist in polymorphic modifications.

1 : 3 : 5-Trinitrobenzene was the first instance which I hoped would serve as a substitute for sulphur in vulcanization. Experiment completely confirmed my expectation. It was found that both synthetic and natural caoutchoucs are vulcanized more rapidly and easily by various nitro-compounds than by sulphur itself under the same conditions. The result was a product possessing all the associated physical properties of caoutchouc vulcanized by means of sulphur. Experiments were made with both fatty and aromatic nitro-compounds, and vulcanization took place with nitrobenzene, dinitrobenzenes, trinitrobenzenes, tri- and tetra-nitronaphthalenes, picric acid, picramic acid, picryl chloride, "artificial musk," nitro-cyclohexane, and many other compounds.

Further investigation showed that the vulcanizing properties of nitro-compounds do not depend on their capacity for combining at the double linking. As is well known, picric acid combines with ethylenic compounds considerably more readily than most other nitro-compounds of the aromatic series, and yields more stable products. Next in order come picryl chloride, picramic acid, trinitrobenzene, etc.; dinitro- and mononitro-benzenes do not unite at all with ethylenic derivatives.

On the other hand, according to their vulcanizing power, nitro-compounds are arranged in the reverse order, or, more accurately, in an order which reveals no analogy between the processes of vulcanization and of combination at the double linking.

Caoutchouc is vulcanized most rapidly and easily by 1 : 3 : 5-trinitrobenzene, after which come dinitrobenzene, mononitrobenzene, tetranitronaphthalene. Picric acid and picryl chloride do not yield satisfactory products; vulcanization undoubtedly begins, but, in spite of many series of experiments, I have never succeeded in bringing it to completion; the caoutchouc partially retains its plasticity, and sticks when fresh fractures are pressed together.

*The process of vulcanization is often termed the sulphuring of caoutchouc. Vulcanization by calcium or sodium hypochlorite or free hypochlorous acid, like vulcanization by hologens (bromine, iodine, or iodine bromide), leads, as is known, only to "horny" rubber, *i.e.*, to ebonite-like substances. Compare Marckwald and Frank, "Uber Herkommen und Chemie des Kautschuks," Dresden, page 62.

*When acenaphthere is heated with sulphur, the hydrocarbon $C_{16}H_{18}$ (decacyclene) is formed.

Mononitrobenzene, however, gives completely satisfactory results.*

The combining capacity of nitro-compounds increases with the number of nitro-groups in the molecule, but we are convinced that the vulcanizing power of nitro-compounds does not depend on this cause. Ostromyslenski found that tetranitromethane unites with ethylenic compounds of both the aromatic and aliphatic series, but in no case has it been possible to vulcanize caoutchouc with tetranitromethane, although a large number of attempts have been made.

Various other substances which, like nitro-compounds, are able to unite with ethylenic derivatives, have also been tried, among them triphenylmethane and diaminotriphenylmethane. These compounds, in perfect agreement with the above results, cause no trace of vulcanization, the caoutchouc remaining sticky and plastic, and retaining even its pale color.† These facts show that the power of nitro-compounds to vulcanize caoutchouc is not determined by their ability to combine with ethylenes.

Is any rôle in the vulcanization played by the capacity of nitro-compounds to oxidize organic substances—by their property of yielding active oxygen with formation of nitroso-compounds? In other words, does the vulcanizing action of nitro-compounds depend on the combination of active oxygen at the double linking of the caoutchouc? This question must, as experiment shows, be undoubtedly answered in the affirmative. First of all, nitroso- and isonitroso-compounds do not vulcanize, as is shown by experiments with nitrosobenzene and isonitrosocamphor under various conditions. This result leads to the assumption that the vulcanizing power of nitro-compounds belongs to one of the oxygen atoms of the NO_2 radicle. It follows, therefore, that under suitable conditions caoutchouc should be vulcanized by ozone or ozonides, or by various peroxides, per-acids, etc.

This fundamental conclusion has been confirmed by direct experiment, a second new method having been found for the hot vulcanization of caoutchouc by compounds containing active oxygen. Special attention has been paid to the vulcanization of natural and synthetic caoutchoucs with benzoyl peroxide and perbenzoic acid. It is found that caoutchouc is vulcanized by benzoyl peroxide incomparably more rapidly and easily than by sulphur or even nitro-compounds.

In order to confirm the deciding part played by the oxygen atom, attempts were made to vulcanize caoutchouc with barium peroxide. This substance yields its oxygen with moderate rapidity only at very high temperatures, and should not effect vulcanization‡ if the latter is determined by the combination of oxygen at the double linking of the caoutchouc. Actual experiment gives the results expected, since barium peroxide produces no trace of vulcanization.

These new methods of vulcanizing caoutchouc, and the favorable results obtained, are of undoubted scientific and practical interest, and in the first place throw new light on the puzzling mechanism of this process.

We are convinced that the present day vulcanization of caoutchouc begins with a chemical process. Only certain classes of substances—sulphur and some of its derivatives (S_2Cl_2, CaS_5, etc.), nitro-compounds, peroxides and per-acids—bring about vulcanization. The physical constants and peculiarities of the vulcanizing substance are without influence on the final effect. What can there be common to the physical properties of gaseous oxygen, sulphur, tetranitronaphthalene and perbenzoic acid? At the same time it is sufficient to replace the oxygen of dinitrotriphenylmethane by hydrogen or to remove from the nitro-group of nitrobenzene one atom of oxygen, to obtain a compound—diaminotriphenylmethane, nitrosobenzene—absolutely devoid of the power to vulcanize caoutchouc.

In the process of vulcanization, chemical reactions are allotted, therefore, a definite but still quite modest place. Chemical action with the vulcanizing compound occurs with only a negligible fraction of the initial caoutchouc. Thus, it is found that the complete vulcanization of 100 parts of natural Para caoutchouc requires only 0.5 parts of nitrobenzene or 1 : 3 : 5-trinitrobenzene.

There can be no question here of molecular proportions, since 100 parts of $C_{10}H_{16}$ would correspond with a minimum of 156 parts of $C_6H_3(NO_2)_3$. Even if it is assumed that $C_{10}H_{16}$ requires only one atom of active oxygen—which is not true—and that the molecule of trinitrobenzene contains three atoms and that of nitrobenzene one atom of active oxygen, 100 parts of caoutchouc would require 52 parts of trinitrobenzene or 90 of nitrobenzene. Even the corresponding solid ebonite is, however, obtained by vulcanizing rubber in presence of 10-15 per cent. of trinitrobenzene.

Thus, with the actual methods for vulcanizing caoutchouc only a vanishing part of the latter enters into chemical reaction, but this reaction is actually indispensable. The further course of this interesting process is conditioned by physical interaction between the vanishing quantity of caoutchouc which has reacted and that which has remained unchanged.

Thus, we arrive at the conclusion that the vulcanization of caoutchouc is divided sharply into two fundamental phases: (1) A chemical reaction affecting only an insignificant part of the caoutchouc, and (2) adsorption or swelling of the unchanged caoutchouc into the product of this chemical reaction.

Vulcanization may, however, be imagined as an exclusively physical process, since theoretically it may begin with the second phase of the process. Thus, instead of bringing nitro-compound, sulphur, or peroxide into contact with caoutchouc, we may isolate and make use of the minute proportion of substance formed in our first phase; by heating this mixture we should undoubtedly obtain vulcanized caoutchouc. In such case vulcanization takes place in a single phase—adsorption or swelling of the initial caoutchouc into the mixed product, and represents an exclusively physical process typical of caoutchouc. In vulcanization by means of sulphur the existence of the latter in the free state is of no importance, as it is necessary only for the preliminary formation of its compound with caoutchouc, and then only in negligible amount.*

The elastic and other properties of caoutchouc vulcanized, for instance, by trinitrobenzene, are qualitatively and quantitatively identical with those of caoutchouc vulcanized with sulphur. Both substances are devoid of plasticity and stickiness and exhibit similar difficult solubility, etc.

Only by chemical analysis might these two vulcanizates be distinguished, although they are obtained by treatment of caoutchouc by absolutely different compounds. The nature of the vulcanizing substance, is, therefore, almost without influence on the physical properties, solubility and all the elastic properties of the resulting caoutchouc; it has, further, no effect on the chemical properties of the vulcanizate, since the latter contains only a negligible proportion of foreign substance.

It may again be emphasized that the characteristic changes in the properties of caoutchouc produced by vulcanization are determined exclusively by a physical process—the adsorption or "swelling" of the caoutchouc.

These new methods of vulcanization of caoutchouc open up a wide perspective, and it may be that the nitro-compounds, peroxides, and per-acids represent only the "first swallow" and that

* Slight adhesion between freshly cut surfaces, as is well known, does not indicate that vulcanization is incomplete, especially with rubber which has been only recently vulcanized.—H. P. S.

† This again is not necessarily an indication that vulcanization has not taken place.—H. P. S.

‡ It has been already found that the melting point of the vulcanizing substance does not affect the process. Thus, caoutchouc is readily vulcanized by nitrobenzene, which is a liquid, and by tetranitronaphthalene, which melts at 218 degrees, whereas the vulcanization proceeds at 116-145 degrees.

*It may be that this compound vulcanizes caoutchouc only when in "*statu nascendi*."

further work will reveal sooner or later other quite diverse substances capable of vulcanizing caoutchouc like sulphur.†

[SECOND PAPER.]

[From the "Journal of the Russian Physico-Chemical Society," 1915, pages 1,462-1,467. Abstract from "Journal of Society of Chemical Industry," Vol. XXXV, p. 59.]

Further investigation of this method of vulcanization shows that natural Para caoutchouc is completely vulcanized by as little as 0.5 per cent of trinitrobenzene, whereas 6 per cent of sulphur would be required. Further, in the latter case, the unavoidable presence of free, uncombined sulphur lowers the technical value of many rubber wares. The use of different organic compounds for vulcanization of caoutchouc allows of considerable variation in the physical properties, *e. g.*, flexibility, elasticity, etc., besides in the color, smell, etc. Vulcanization may be effected by mono-, di-, and trinitrobenzenes, -toluenes, etc., tri- and tetra-nitronaphthylamines, picramic acid, picryl chloride, artificial musk, nitrocyclohexane, nitro-dyestuffs, etc. Metallic oxides, which facilitate the vulcanization of rubber by sulphur and enhance the value of the product obtained, exert a similar effect on vulcanization by nitro-derivatives; lead oxide is most valuable in this respect, and then follow, in order, oxides of zinc, calcium, magnesium, barium. On the other hand, mixtures of aliphatic amines with the above oxides, although they accelerate vulcanization by sulphur or lower the temperature of the process to 10 to 15 degrees C., retard vulcanization by nitro-compounds and lower the value of the corresponding product. Like sulphur and sulphur chloride, nitro-derivatives vulcanize, not only caoutchouc, but also various vegetable oils yielding products analogous to factice.

[THIRD PAPER.]

[From the "Journal of the Russian Physico-Chemical Society," 1915, pages 1,467-1,471. Translated from the original Russian by T. H. Pope, B.Sc.]

The vulcanization of caoutchouc by means of peroxides proceeds considerably more rapidly and at a lower temperature than vulcanization by means of sulphur or even nitro-compounds. The theoretical significance of this process has been already considered in earlier papers.

Vulcanization by the action of benzoyl peroxide has been investigated in detail. It is found: (1) That metallic oxides which accelerate the vulcanization of caoutchouc by means of sulphur or nitro-compounds—PbO, ZnO, MgO, CaO, etc.—are almost without effect on vulcanization by benzoyl peroxide; in some cases they diminish the velocity of the process, and in most instances increase the oxidizability, that is, the rate of decomposition, of the given vulcanizate. (2) Colophony and other resins lower the stability of caoutchouc on vulcanization by benzoyl peroxide. (3) Mixtures of amines and metallic oxides, which were found by the author to act as accelerants of the ordinary vulcanization of caoutchoucs by sulphur, retard vulcanization by the new method and decrease the stability of the corresponding vulcanizate. (4) Proteins exert a similar in-

†It might be expected on theoretical grounds that caoutchouc would be vulcanized under suitable conditions by oxides of nitrogen, hydrogen peroxide, ozone, ozonides of the terpenes, oxygen or air in presence of compounds which activate oxygen, and many other substances.

TABLE A.—HOT VULCANIZATION BY NITRO-COMPOUNDS WITHOUT SULPHUR.

Number of Experiment.	Caoutchouc Used.	Grams of Caoutchouc.	Vulcanizing Substance	Grams of Vulcanizing Substance.	Grams of PbO.	Foreign Substances Present.	Pressure of Steam in the Chambers of the Vulcanizing Press.	Prolongation of the Vulcanization in Minutes.	Remarks.
1	Para	100	1: 3: 5-$C_6H_3(No_2)_3$	4	8		45 lbs.	45	Vulcanization complete.
2	Para	100	1: 3: 5-$C_6H_3(No_2)_3$	4	2		45 lbs.	45	Somewhat over-vulcanized.
3	Para	100	1: 3: 5-$C_6H_3(No_2)_3$	4	2		45 lbs.	20	Vulcanization incomplete.
4	Crêpe	10	Ortho-$C_6H_4(No_2)_2$	1	3		3 atmos.	45	Vulcanization complete; product smells of bitter almonds.
5	Crêpe	10	Ortho-$C_6H_4(No_2)_2$	1	3		3 atmos.	60 or 120	Product difficult to distinguish from No. 4.
6	Crêpe	100	Ortho-$C_6H_4(No_2)_2$	16	20	10 grams piperidine preparation No. 2	3 or 4 atmos.	5, 10, 45, 120	No vulcanization.
7	Peruvian	10	$C_6H_3No_2$	0.5	3		3 atmos.	120	Vulcanization complete; possesses smell of bitter almonds.
8	Peruvian	10	1: 2: 6: 8-tetranitronaphthalene	1	3		3 atmos.	120	Vulcanization complete; the high m.p. 204° probably determines the slowness of the process in this case.
9	Crêpe	10	1: 3: 5-$C_6H_3(No_2)_3$	0.05	3		4 atmos. for 40 minutes and 3 atmos. for 30 minutes	..	Vulcanization complete.
10	Crêpe	10	1: 3: 5-$C_6H_3(No_2)_3$	0.08	0		3 atmos.	120	30 mins.—vulcanization begins, at 90 mins. becomes apparent, and in 120 mins. is complete.
11	Crêpe	100	1: 3: 5-$C_6H_3(No_2)_3$	8	0	20 grams Mgo.	3 atmos.	45	Vulcanization complete.
12	Crêpe	10	β-tetranitronaphthalene.	24	3		3 atmos. for 90 minutes and 4 atmos. for 30 minutes	..	Vulcanization complete.
13	Crêpe	10	β-tetranitronaphthalene.	24	3		3 atmos.	150	Vulcanization complete; product possesses an abnormal volume much greater than the form.
14	Crêpe	10	β-tetranitronaphthalene.	1	3	0.35 grm. piperidine	4 atmos. for 30 minutes and 3 atmos. for 30 minutes	..	Vulcanization complete.
15	Peruvian	10	Picramic acid	1	3		4 atmos.	40	Only traces of vulcanization observed.
16	Peruvian	10	Picramic acid	1	3		4 atmos. for 30 minutes and 3 atmos. for 90 minutes	..	Almost complete vulcanization, but product not so good as the preceding ones.
17	Peruvian	10	Picric acid	0.8	3		4 atmos. for 30 minutes and 3 atmos. for 90 minutes	..	Incomplete vulcanization, product sticky, plasticity partly retained; little elastic and supple.
18	Peruvian	10	Picryl chloride	0.8	3		3 atmos.	30	Product surpasses Nos. 15, 16 and 17.
19	Peruvian	10	1: 3: 5-$C_6H_3(No_2)_3$	2	0	1.2 grm. linseed oil	3 atmos.	120	Not vulcanized.
20	Mixture from 19	9.3	1: 3: 5-$C_6H_3(No_2)_3$	..	3	1.2 grm. linseed oil	3 atmos.	45	Vulcanization complete.
21	Peruvian	10	1: 3: 5-$C_6H_3(No_2)_3$	2	3		3 atmos.	60	Physical properties almost identical with No. 20.
22	Peruvian	10	0.05 grm. 1: 3: 5-$C_6H_3(No_2)_3$ and 0.05 grm. sulphur	..	3		3 atmos.	30	Complete vulcanization.
23	Normal erythrene	10	1: 3: 5-$C_6H_3(No_2)_3$	0.8	3	1.5 grms. colophony	3 atmos.	5	Vulcanization complete.
24	Normal isoprene	8	1: 3: 5-$C_6H_3(No_2)_3$	0.8	2.4		3 atmos.	5	Vulcanization complete; in 15 mins. (3 atmos.) strongly over-vulcanized product obtained.
25	Abnormal dimethylerythrene	100	1: 3: 5-$C_6H_3(No_2)_3$	7.5	3		3 atmos.	5	Vulcanization complete; elastic point of the vulcanizate lies at about 89-90°.

fluence on the vulcanization of caoutchoucs by means of sulphur, nitro-compounds or peroxides; they increase the extensibility and the constant K', *i.e.*, the tensile strength of the vulcanizate.

On normal vulcanization by means of benzoyl peroxide the physical structure of caoutchouc is not destroyed. It is, however, necessary to avoid excess of the peroxide and, for every given benzoyl peroxide mixture, to establish exactly the necessary temperature and time for the vulcanization. If not, the vulcanizate will exhibit, like "abnormal" and also like chemically pure caoutchoucs, negligible extensibility and tensile strength*; the protein compounds may be oxidized by the benzoyl peroxide, and their destruction may be accompanied by that of the physical structure of the given caoutchouc.

Caoutchoucs normally vulcanized by benzoyl peroxide exhibit both qualitatively and quantitatively all the typical properties of caoutchoucs vulcanized by either sulphur or nitro-compounds; when kept, they do not change.† Caoutchoucs vulcanized with a slight excess of benzoyl peroxide soon (1-5 days) develop on their surface soft, colorless, crystalline leaflets, which are as transparent as glass, and possess pronounced lustre; after the lapse of a longer time (1, 3 or 5 months) the vulcanizate begins to oxidize and gradually becomes sticky; finally it runs, becoming converted into a sticky, more or less viscous, plastic mass‡. The vulcanizate decomposes especially rapidly when in contact with the original, non-vulcanized mixture, which evidently acts as a "detonator."

Consequently, when different mixtures of caoutchouc and benzoyl peroxide are either heated or stored, two processes take place simultaneously: (1) Vulcanization of the original caoutchouc, this being connected with partial or complete union of the oxygen of the peroxide with the caoutchouc, and (2) oxidation of the caoutchouc by the benzoyl peroxide with formation of the highly sticky mass mentioned above.

The relative rates of these two processes determine the effect of the vulcanization, and experiment shows that these rates depend on the proportion of benzoyl peroxide, on the temperature, on the prolongation of the vulcanization, and on the nature and quantities of the foreign matters in the initial mixture.

Vulcanization of caoutchouc with benzoyl peroxide requires, therefore, increased attention or skill in the operator.

When once started at a high temperature, the process of vulcanization continues comparatively rapidly, even at the ordinary temperature. Thus, it was found that a mixture of normal erythrene caoutchouc and a small excess of benzoyl peroxide converted after 27 days into a very sticky, viscous mass, which later gradually runs or assumes the form of the containing vessel. When previously heated, without access of air, for two minutes at 85 degrees, the same mixture does not run when kept (at the ordinary temperature); on the other hand, the stickiness already present disappears spontaneously; the plasticity of fresh sections and their proneness to become sticky are lost, and the mixture gradually vulcanizes at the ordinary temperature, and finally even over-vulcanizes owing to the excess of benzoyl peroxide present.

It is seen that the relative velocity of oxidation, on the one hand, and of vulcanization on the other, depends on the character of the preliminary treatment, in the given case on the two-minutes' heating at 85 degrees.

This fact explains immediately why incomplete vulcanization protects caoutchouc from oxidation or decomposition in the air.

The benzoyl peroxide may be replaced by perbenzoic acid, and probably by ozone, ozoides of caoutchouc or terpenes, oxides of nitrogen, certain metallic peroxides, hydrogen peroxide, etc.

Further, my observations show that barium peroxide produces no trace of vulcanization in caoutchouc. Into natural Para caoutchouc were introduced 1 per cent, 5 per cent, 10 per cent, 15 per cent and 50 per cent BaO_2, the mixtures being vulcanized for 5 minutes, 10 minutes, 30 minutes, and 2 hours with steam at 2, 3 and 4 atmospheres' pressure in a press; under these conditions the mixture underwent no change, its plasticity and even its light color remaining quite unaltered. This interesting observation lends further confirmation to the fact that vulcanization of caoutchouc by the above method takes place at the expense, not of the peroxides themselves, but of their active oxygen.

The accompanying table contains recipes for the vulcanization of different caoutchoucs with benzoyl peroxide. It must be pointed out, however, that the external conditions indicated in this table are by no means ideal.*

To conclude, in presence of 0.5-3 per cent of benzoyl peroxide, normal synthetic caoutchouc obtained on coagulation of its solution, undergoes at about 80 to 120 degrees C. incomplete vulcanization; the external appearance, and all the new properties of the product obtained compel the assumption that some forms of natural rubber represent products of incomplete (incipient) vulcanization caused by active oxygen.†

*Presumably corresponding with over-vulcanization in the case of ordinary rubber and sulphur compounds.—H. P. S.

†I have samples of vulcanized caoutchouc which have been kept for six months without change.

‡Some caoutchoucs, for instance, normal erythrene caoutchouc, vulcanized with a large amount of benzoyl peroxide, gradually solidify when kept, yielding a dense, brittle mass, easily powdered but absolutely without stickiness.

*The detailed recipes for the vulcanization of caoutchouc by means of benzoyl peroxide, together with other documents kept in my pocket-book, were unfortunately stolen from me.

†Or by compounds containing active oxygen, etc.

TABLE B.—VULCANIZATION BY ORGANIC PEROXIDES.

Number of Experiment.	Caoutchouc Employed.	Grams of Caoutchouc Taken.	Grams of Benzoyl Peroxide.	Grams of Lead Oxide.	Grams of Magnesium Oxide.	Grams of Zinc Oxide.	Grams of Foreign Substances.	Pressure of Steam in the Chamber of the Vulcanizing Press.	Time in Minutes Occupied by the Vulcanization.	Observations.
1	Natural Para	20	6 of 30%	..	..	..	..	1 atmos. (119°)	5	Vulcanization complete; product quite transparent; pale cinnamon color.
2	Natural Para	20	4 of 20%	..	..	..	..	2 atmos.	15	Vulcanization complete.
3	Mixture of experiment 1	6	..	1.5	..	..	..	1 atmos.	5	Vulcanization complete; product differs from No. 2 only by its darkish color and its non-transparency.
4	Mixture of experiment 1	..	..	..	..	..	..	0.5 atmos.	15	
5	Natural Para	5	1 of 20%	..	..	1.5	..	2 atmos.	15	Vulcanization complete; product opaque.
6	Natural Para	5	1	1.5	..	..	..	2 atmos.	15	Vulcanization complete; product opaque.
7	Natural Para	5	1	..	1.5	..	..	2 atmos.	15	Vulcanization complete; product opaque and tougher and more leathery than Nos. 5 and 6.
8	Dimethylerythrene "photopolymeride"	15.6	1.6 of 10%	..	..	..	..	Vulcanized at 80°	15	Almost complete vulcanization; product transparent; at higher temperatures the caoutchouc undergoes profound oxidation.*
9	Normal erythrene	6	1.2 of 20%	..	..	..	6 of colophony	1 atmos.	6	Vulcanization complete; over-vulcanized even; product translucent.
10	Natural Para	100	10 of 10%	10	..	..	..	2 atmos.	30	Vulcanization complete; product opaque and possessing sufficient tensile strength.†

*Products of acid odor are formed, evidently identical with those appearing when this caoutchouc is kept in the air.
†When kept, this product does not change in six months.

Proceedings of the "Rubber Section"—Continued.

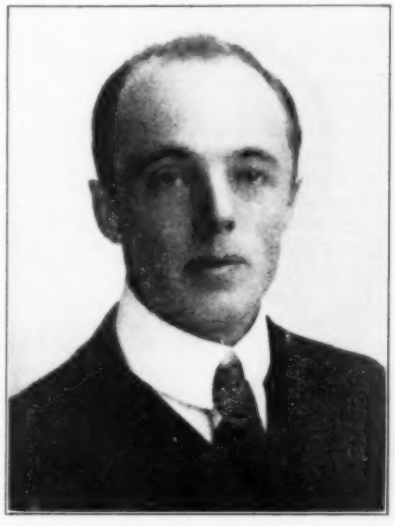
Two important addresses delivered before the Rubber Section of the American Chemical Society during the September, 1916, Convention were printed here last month. Below are given three other interesting papers. A full report of the symposium, in which some 20 rubber chemists participated, will be given in the December issue.

WET COMBUSTION IN THE NITROSITE-COMBUSTION METHOD FOR THE DIRECT DETERMINATION OF RUBBER.*

By L. G. Wesson and E. S. Knorr.

IN order to make more feasible the possible use in technical laboratories of the nitrosite combustion for the direct determination of rubber in rubber goods, we have attempted the application of "combustion in the wet way" to this analytical procedure.

The "nitrosite-combustion" method as described in a previous publication, is based upon the formation of the "nitrosite" of rubber by the action of nitrogen oxide gases upon the caoutchouc of the sample. This is then separated from other substances (fillers), and burned in a specially constructed electrically-heated combustion tube. The special apparatus and technique required was a decided obstacle to the general use of this method, even should its reliability be demonstrated, and we therefore turned to "wet combustion" as an escape from this difficulty.



L. G. WESSON.

E. S. KNORR.

In the course of our experiments, acetone - extracted crude rubber was first used. The nitrosite was formed in the flask used for the combustion, and after the complete expulsion of the rubber solvent (chloroform), the combustion followed in a manner quite similar to those later described. We obtained as dependable values, 96.8, 97.0, 97.6 and 97.1 per cent C_{10} H_{16}. Average is 97.1 per cent; theoretical, 97.3 per cent C_{10} H_{16}.

In the regular analytical procedure this simple treatment of the nitrosite is not possible, since the latter must be separated from the mineral matter and other impurities by the use of some solvent, after filtration from the chloroform. We first used as solvent, acetone, which was added to the dry nitrosite in the combustion flask. The acetone was first evaporated off, then the flask was heated 1 1/2 hours by a boiling water bath whilst a current of dry air passed slowly through the flask. The value now obtained, (100.7 per cent) upon combustion, indicated a retention of acetone.

A repetition of this experiment with the use of only ethyl acetate as solvent gave 96.4, 97.1 and 97.0 per cent C_{10} H_{16}. These figures were more promising. Moreover, the ethyl acetate on evaporation left the residual nitrosite in a more porous, and thus more favorable condition for rapid expulsion of the organic solvent than did the acetone. Ethyl acetate was therefore adopted as the solvent in all of the analyses of vulcanized rubber.

The use of acetic ester did not, however, eliminate our troubles with retained solvent, as we found when we next turned to the analysis of compounded rubber samples, instead of the raw gum. We believe that this difficulty explains most of the erratic results we had to the end of our work. We believe that we have now found the remedy for this retention of solvent in the addition of water, containing a drop of hydrochloric acid, to the nitrosite, and subsequent evaporation of this to dryness, after all solvent has been removed in the ordinary way.

In a sample compounded with 35.0 per cent Fine Para, using the method described, we found 34.7, 34.9, 34.8 and 34.2 per cent $C_{10}H_{16}$. Average is 34.7 per cent; theoretical, 34.4 per cent C_{10} H_{16}.

In a sample compounded with 40.0 per cent plantation rubber, we found 38.9, 39.8, 37.9, 38.1 and 37.7 per cent C_{10} H_{16}. The average is 38.5 per cent, and the theoretical value is 38.3 per cent C_{10} H_{16}.*

THE PROCEDURE.

PREPARATION OF THE NITROSITE FOR THE COMBUSTION. After the rubber sample has been ground in a meat-chopper to pass a 20-mesh sieve, and 1/2 gram of it extracted 3 hours with acetone, and 1/2 hour or longer with chloroform, the extracted sample is allowed to dissolve in, or thoroughly absorb chloroform. A small Florence flask (75 cc.) is used, which may be about one-half full of the solvent. Nitrous oxide vapors, evolved from dilute nitric acid (specific gravity 1.3) and arsenic trioxide, are then passed through the cooled chloroform until the deep green color becomes permanent for, say, 15 minutes, and the whole allowed to stand over night for completion of the action.

The chloroform is then decanted through a dry Gooch crucible and asbestos matte (the former rests in an ordinary 60 degree filter funnel) into the combustion flask, from which the chloroform is then evaporated by means of a boiling water bath and a dry air current.† Meanwhile the residue in the Florence flask has been similarly dried. The separation of fillers and nitrosite is now brought about in the following way. Small portions (5 cc.) of calcium chloride-dried ethyl acetate are added to the residue in the Florence flask, the latter warmed, and the liquid

*The article here published represents thesis work done by one of us (E. S. Knorr) in the course for the degree of Bachelor of Science in Chemistry from the Case School of Applied Science.

*These samples were kindly sent us by the Bureau of Standards.

†J. B. Tuttle, of the Bureau of Standards, has found that the chloroform-soluble residue thus recovered may be very appreciable, and it is to his suggestion that this modification is due.

decanted through the Gooch crucible into the combustion flask, repeatedly, until the filtrate runs through entirely colorless. After evaporation of the acetate (recovery of the solvent as well) the residue is carefully freed from solvent by warming the containing flask in a boiling water bath for, say, 15 minutes, after which 15 cc. of water containing 1 drop concentrated HCl, are added, and quickly evaporated by the use of a boiling calcium chloride bath and brisk current of dry air. The heating is continued at least one-half hour after the residue is again apparently dry.

THE COMBUSTION APPARATUS. This consists of a 200 cc. round bottomed distilling flask, which is provided with a dropping funnel (100 cc.) through a one-holed rubber stopper, and a series of U tubes containing in order: (1) concentrated H_2SO_4—$K_2Cr_2O_7$, renewed every 1 or 2 combustions; (2) water containing a drop of the preceding; (3) granular zinc; (4) calcium chloride; (5) soda-lime (weighed); (6) soda-lime and calcium chloride (weighed).

THE COMBUSTION. The weighed soda-lime tubes in position, and the combustion flask cooled by water, a volume (20 cc.) of cooled concentrated sulphuric acid is run rapidly into the flask on the nitrosite; then the cooled oxidizing solution of 10 grams pulverized $K_2Cr_2O_7$ in 75 cc. concentrated H_2SO_4, in a very slow stream. The flask may now be gently warmed by a sand bath to obtain a moderately rapid evolution of gas.* This is done as long as gas continues to be evolved (about one hour), when a carbon dioxide-free current of air, the heating being maintained, is passed via the dropping funnel through the apparatus for at least one-half hour to sweep all carbon dioxide into the soda-lime tubes.

$$\text{Weight } CO_2 \times \frac{136}{440} \times 200 \text{ gives percentage } C_{10}H_{16} \text{ in the sample.}$$

We hope, in conclusion, that further study and improvements of this method will eventually give a reliable and not too difficult procedure for the direct determination of rubber, not only in good quality compounds, but also in factice and other inferior substitute-containing rubbers.

*That carbon monoxide is formed during the combustion can be shown by allowing the gases which have passed the absorption train to come in contact with heated copper oxide and then barium hydroxide solution. A precipitate ensues, but the amount is not appreciable for the results of the analysis.

ANILINE METHOD FOR DETERMINATION OF MINERAL FILLERS IN RUBBER.

By Otto H. Klein, John H. Link and Frank Gottsch.

ALTHOUGH the use of aniline as a solvent for vulcanized rubber is not new, there is very little information to be found concerning it in the literature. We have therefore thought that an account of the method as far as it has been worked out, together with some analyses of samples of known composition, would be of interest.

This report should be considered as a preliminary one, as the supply of rubber mixings at hand was limited and other rubber fillers are yet to be experimented with.

In making the determination it is essential that the sample be finely powdered (20 mesh). A one-gram sample is extracted with acetone for four hours, dried at a low temperature, and then transferred to a weighed 100 cc. centrifuge tube. It is covered with 50 cc. of pure aniline and 5 cc. of nitrobenzene, stirred, covered, and heated at 160 degrees C., with occasional stirring until solution is complete.

It is our practice to heat the samples over night in a Freas oven, and in most cases the samples are completely dissolved by the next day. Sometimes the sample dissolves in three to four hours. If the rubber is not yet in solution, it can be seen by stirring with a glass rod. When solution is complete, there is nothing to be seen but fine pigment, free from rubbery appearance.

The chemist who makes the analysis for the first time may be uncertain of himself at this point, but after one or two determinations have been made he will at once recognize any undissolved rubber.

The tube is allowed to cool sufficiently, filled up with ether and well stirred. It is then centrifuged for 15 minutes at 1,500 R.P.M.

The supernatant liquid is decanted, about 25 cc. of ether added and the pigment stirred up completely. It is centrifuged again and the decantate added to the first. Four washings with ether are sufficient. The tube is dried at 100 degrees C., cooled and weighed. The united decantates are evaporated and then ignited in a weighed porcelain or silica dish. The weight of fillers in it is added to that in the tube.

The percentage of fillers plus that of total acetone extract is subtracted from 100 per cent, and the difference recorded as rubber gum.

ANALYSES OF SAMPLES BY ANILINE METHOD.

	O No. 1	*O No. 2*	*H*	*I*	*J*	*U No. 1*	*U No. 3*	*G No. 1*	*C*	*G No. 14*
Pure Rubber (Fine)	40.3	40.3	40.3	40.0	30.0	40.0	40.0	37.0	24.44	37.0*
Sulphur	2.0	2.0	2.0	4.0	3.0	3.0	3.0	3.0	.....	3.0
Zinc Oxide	18.9	18.9	18.9	.....	30.0	14.0	56.0	30.0	.....	30.0
White Lead (Dutch)	18.9	18.9	18.9	.....	.....	.....	.....	15.0	11.11	.....
Light Magnesia Carbonate	9.9	9.9	9.9	.....	.....	.....	.....	.....	4.44	.....
Hydrated Lime	2.0	2.0	2.0	.....	.....	.....	.....	.....	6.67	.....
Litharge	8.0	8.0	8.0	.....	.....	10.0	.....	15.0	6.67	.....
Whiting	.....	.....	.....	26.0	.....	.....	.....	.....	.....	.....
Lithopone	.....	.....	.....	20.0	.....	.....	.....	.....	.....	.....
Vermilion	.....	.....	.....	.....	15.0	.....	.....	.....	.....	.....
Carbon Black	.....	.....	.....	.....	.....	.....	.....	.....	.....	10.0
Golden Antimony	.....	.....	.....	10.0	.....	.....	.....	.....	26.67	.....
Magnesium Oxide	.....	.....	.....	.....	5.0	.....	.....	.....	.....	.....
Aluminum Flake	.....	.....	.....	.....	17.0	.....	.....	.....	.....	.....
Sublimed White Lead	.....	.....	.....	.....	.....	33.0	.....	.....	.....	20.0
Asbestos	.....	.....	.....	.....	.....	.....	.....	.....	11.11	.....
Plumbago	.....	.....	.....	.....	.....	.....	.....	.....	8.89	.....
Cure: Minutes	20	90	100	100	100	80	130	.....	60	.....
Cure: Pressure or temperature	40 lbs.	40 lbs.	250° F.	250° F.	250° F.	30 lbs.	38 lbs.	.....	60 lbs.	.....
Fillers Found	58.76	59.36	58.72	55.00	67.03	58.60	57.56	60.03	74.11	60.44
	58.71	59.43	58.40	54.70	67.79	.....	57.40	.....	.....	.....
Organic Acetone Extract	1.09	1.23	1.03	1.31	0.74	0.99	1.19	1.29	0.80	5.04
Free Sulphur	0.42	0.20	0.97	4.50	2.24	0.88	2.00	1.82	0.30	1.48
Rubber	39.75	39.17	39.44	39.34	29.60	39.53	39.33	36.85	24.79	33.04
Fillers in Dish	0.10	0.18	0.47	0.00	8.21	0.32	9.32	0.44	1.43	3.60
	0.00	0.36	0.82	0.09	5.51	.....	6.95	.....	.....	.....

*Caucho Rubber.

Aniline differs from other solvents in that rubber dissolved in it forms a thin solution which permits the mineral fillers to separate readily.

Samples *O No. 1* and *O No. 2* are the same, except that *O No. 2* was purposely over-cured. Sample *H* was prepared using the same recipe but by another manufacturer. Sample *H*, *I* and *J* were unintentionally under-cured. Sample *C* is a hard valve. Sample *G No. 14* contains caucho rubber.

The small amount of nitrobenzene is used, because it makes solution more rapid. It was found that semi-cured compounds dissolve more slowly than thoroughly cured soft stocks or very hard ones. With under-cured compounds a soft, pasty mass is formed, which is very slow to dissolve, while this does not occur if the material is properly vulcanized.

We found that in a few cases an additional digestion with half the quantity of solvent for five hours reduced the amount of mineral fillers about 0.5 per cent. In specification work it is advisable to make this second digestion after the ether has been expelled from the tube by heating.

Analysis of the fillers shows that the rubber as found by difference will not include the sulphur of vulcanization.

It will be noted that the sum of the percentages of rubber found and organic acetone extract is slightly greater than the percentage of rubber used in the recipe.

The fillers during vulcanization and afterwards in the course of analysis have combined with sulphur to form new compounds. If this combination of fillers and sulphur is a substitution of sulphur for some other acid radical, the resultant product would weigh less than the sum of the ingredients entering the reaction and the rubber found by difference would be slightly greater thereby.

We expect to continue these experiments when other samples are available, and a final report will be made on the subject when we have all the data at hand.

REPORT OF THE JOINT RUBBER INSULATION COMMITTEE.

THE Joint Rubber Insulation Committee, whose preliminary report was printed in THE INDIA RUBBER WORLD, February 1, 1915, has now completed a second report, which was presented in abstract to the Rubber Section of the American Chemical Society on September 29 by William A. Del Mar, the secretary of the committee. The second report, like the first, presents a specification for high-grade rubber insulation for electric wires and cables, and an analytical procedure for use in connection therewith.

The specification is identical with that in the preliminary report, except that the first clause is altered to read as follows:

"A 30 per cent fine Para or best quality plantation *Hevea* rubber compound with mineral fillers, shall be furnished." The change consists in the substitution of "best quality plantation" for "smoked first latex," which appeared in the earlier report.

The analytical procedure has been changed in two important particulars, and a number of minor improvements have been made. One of the changes is the elimination of the terebene method, and the substitution of a modified ash method, for the determination of fillers and rubber. This method is a modification of one devised by G. H. Savage. A general outline of the procedure is given on the diagram below. It will be seen that the residues from the alcoholic potash saponification are treated with hydrochloric acid to remove organic matter, and the part insoluble in acid is dried and divided into two parts, one of which is used to the determination of sulphur, and the other ignited. A sulphur determination is also made on the ash. The rubber hydrocarbons as a percentage of the total sample are given by the following formula:

$$\text{Rubber Hydrocarbons} = 100\,\frac{C}{4}\left[1 - \frac{E-F}{D} - \frac{H}{G}\right]$$

The total weight of sample used in the determination is 4 g. and the letters *C*, *D*, *E*, *F*, *G*, and *H* represent the weights in grams of the substance indicated in the diagram.

The other important change is the adoption of the Bureau of Standards nitric acid-bromine method for the determination of total sulphur.

A qualitative test for organic fillers has also been added.

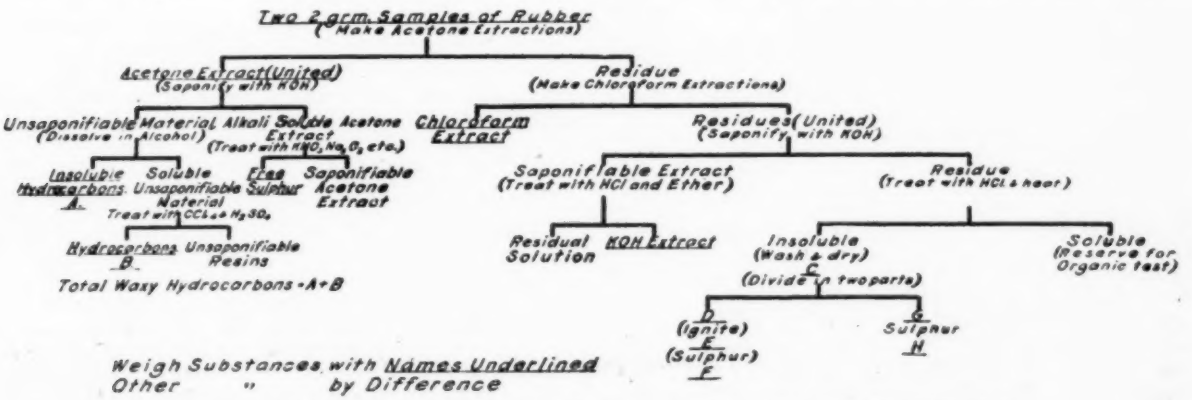
The complete report will not be available until it has been approved by the General Committee, which appointed the Joint Rubber Insulation Committee. It is hoped that arrangements for publication will be made in about a month.

The Joint Rubber Insulation Committee has now been at work for five years and has held 25 meetings, in addition to numerous sub-committee meetings. The committee has been an active one, and its influence has been widely felt, the specification and the greater part of the preliminary analytical procedure being now accepted as standard by electrical engineers and rubber chemists.

The following abstracts from the report read at the meeting of the Rubber Section, give the details of the determination of rubber hydrocarbons and total sulphur, and should be read in conjunction with the preliminary report referred to above.

ALCOHOLIC POTASH EXTRACT.

SECTION 28. Dry the residues from the chloroform extractions at 50 to 60 degrees C. until the odor of chloroform can no longer be detected; unite the residues from the two 2-gram samples in a 200 cc. Erlenmeyer flask. Add 100 cc. alcoholic potash solution and boil for four hours under a reflux condenser. Filter the solution by decantation through an 11 cm. hardened filter paper into a beaker and wash twice, using each time 25 cc. hot



OUTLINE OF METHOD OF RUBBER ANALYSIS EXCLUSIVE OF TOTAL SULPHUR DETERMINATION.

absolute alcohol and then wash thoroughly with hot water. Wash any rubber on the filter paper back into the original flask and reserve this for the determination of rubber hydrocarbons. Evaporate the solution to approximate dryness, take up in warm water and transfer to a separatory funnel. Acidify with 30 cc. 5 normal hydrochloric acid, using this to rinse the beaker. Add sufficient water to make the bulk of the solution 100 cc. When cool add 40 cc. ether, using it to rinse the beaker in 20 cc. portions. Shake the aqueous and ethereal solutions thoroughly. After complete separation, draw off the aqueous solution and treat in another separatory funnel, with a fresh 20 cc. portion of ether. Continue to shake the aqueous solution with fresh portions of ether until a colorless portion has been obtained, then shake out twice more. Unite the ethereal solutions and wash with successive additions of water, continuing twice after the water shows no acid reaction. Filter through a plug of extracted cotton into a tared flask, wash the filter and funnel with ether, evaporate the ether without boiling and dry the residue at 95 to 100 degrees C. Cool in a desiccator and weigh. Continue to dry until constant weight is obtained.

RUBBER HYDROCARBONS.

SECTION 29. Add to the flask containing the rubber residue from the alcoholic potash extraction, sufficient water to make the total volume of the solution 125 cc. and then add 25 cc. concentrated hydrochloric acid. Heat for an hour at 97 to 100 degrees C. Decant the supernatant liquid through a hardened filter paper on a Buchner funnel 7 cm. in diameter, using suction; wash the residue with 25 cc. hot water and decant. (While a Buchner funnel is recommended, it is permissible to use an 11 cm. hardened filter paper with platinum cone, in a 60 degree funnel). Perform this entire treatment with water and hydrochloric acid, three times and save the first and second decantations for the "organic matter" test described in Section 36. The rubber at this stage should be white and practically free from black specks of undissolved fillers; if not, continue the acid treatment until the black specks disappear. (If carbon is present, all the particles of rubber will be grayish, bluish, or black, depending on the form and quantity of carbon used. Black specks in light particles of rubber usually indicate the presence of lead sulphide which must be removed to prevent the formation of lead sulphate on igniting the residue *C*. Add 150 cc. hot water to the flask and let stand on a steam bath or hot plate for half an hour and decant through the filter paper. Return to the flask any rubber that goes on the filter paper. Repeat until the washings are free from chlorides (See Section 36). Transfer all the rubber in the flask to the filter paper and dry as much as possible by suction. Wash the rubber with 50 cc. of 95 per cent alcohol, using suction. Transfer the entire residue to a weighing bottle. Dry at 95 to 100 degrees C. for an hour, cool in a vacuum desiccator under reduced pressure and weigh. Dry for a half hour, cool and weigh, repeating this process until either constant weight is reached or the weight starts to increase. Let this weight be represented by *C*. On a portion *D* of this residue *C* determine the ash *E*, according to Section 30 and the sulphur *F* in the ash *E*. Determine the sulphur *H* in another portion *G* of residue *C*. Make all sulphur determinations as described under "Total Sulphur."

SECTION 30. Place about 0.5 grams of residue *C* into a weighed porcelain crucible. Let the weight of residue be represented by *D*. Heat gently, gradually driving off the volatile matter. When the crucible has ceased to smoke, raise the temperature gradually to between 450 and 500 degrees C. until all organic matter has been burned away, which is usually indicated by the ash becoming white. (An electric muffle furnace with pyrometer is recommended for this purpose.) Cool in a desiccator and weigh, the weight of ash being represented by *E* in the formula for rubber hydrocarbons. Make sulphur test on ash by the method described under "Total Sulphur." If, however, $50 \times C \times E$ is not over unity, the determination of sulphur in the ash may be omitted and *F* assumed to be zero.

Then,

$$\text{Rubber Hydrocarbons} = 100 - \frac{C}{4}\left[1 - \frac{E\text{-}F}{D} - \frac{H}{G}\right]$$

expressed as a percentage of the total sample.

TOTAL SULPHUR.

SECTION 31. Place 0.5 grams of rubber in a porcelain crucible of about 100 cc. capacity. Add 20 cc. nitric acid-bromine reagent, cover the crucible with a watch glass, and allow to stand for one hour. Heat very carefully for an hour, remove the cover, rinsing it with a little water, and evaporate to dryness. Add 5 grams of the KNO_3—Na_2CO_3 fusion mixture, and 3 to 4 cc. of distilled water. Digest for a few minutes, and then spread the mixture half way up the side of the crucible to facilitate drying. Dry on a steam bath or hot plate. Fuse the mixture, using a sulphur-free flame until all the organic matter has been destroyed and the melt is quite soft. Allow to cool, place the crucible in a 600 cc. beaker, and cover with water. Digest three or four hours on the steam bath. Filter into an 800 cc. beaker, washing thoroughly with hot water. The total volume should be about 500 cc. Allow to cool, add 7 to 8 cc. concentrated hydrochloric acid to the filtrate, and heat on the steam bath. Test the solution for acidity with Congo paper and add 10 cc. of hot barium chloride solution. Allow to stand over night, filter, wash, weigh the barium sulphate and calculate to sulphur.

INTERPRETATION.

SECTION 34. The percentage of rubber shall be considered to be the sum of the rubber hydrocarbons, saponifiable acetone extract, unsaponifiable resins, chloroform and alcoholic potash extracts, expressed as percentages. If the chloroform extract is over 3.0 per cent of the rubber so calculated, subtract the excess from the rubber. If the KOH extract is over 1.8 per cent of the rubber, as first calculated, subtract this excess also from the rubber.

ORGANIC FILLERS.

SECTION 36. Transfer the first and second decantations of the hydrochloric acid solutions to a carefully cleaned porcelain dish and add 20 cc. concentrated sulphuric acid. Place dish on steam bath or hot plate to drive off water and hydrochloric acid. A pronounced charring of the residue indicates the presence of organic matter soluble in water or hydrolyzed by hydrochloric acid.

Examine filter paper and rubber while decanting acid solution and again while washing free of chlorides. Some types of organic fillers not removed by water and hydrochloric acid, would be plainly visible at this point.

Place a small portion of residue *C* under a microscope and examine for fibrous and other characteristic organic material. If organic fillers are indicated and not clearly proven by this test, place 1 gram of the organic sample in a beaker, add 75 cc. xylol and heat on hot plate until the rubber is dissolved. Decant xylol solution and wash residue with ether several times by decantation. Dry residue and examine under the microscope.

NEW YORK RUBBER MANUFACTURERS BUSIER.

According to the report of the Industrial Commission of the New York State Department of Labor, the manufacturers of rubber and gutta percha goods in that State employed from 16 to 21 per cent more workers from March to August, 1916, than were employed in June, 1915 (the basis of computation), and in each of the months the increase over the same month a year ago ranged from 25 to 40 per cent. The payrolls of these manufacturers ran from 33 to 41 per cent higher than the same months last year.

What the Rubber Chemists Are Doing.

VISCOSITY INDEX OF RUBBER.

THE researches of K. Gorter on the viscosity index as a standard for the preliminary testing of the quality of rubber are abridged as follows, by "Chemical Abstracts" (October 10, 1916). The viscosity index is the logarithim of the viscosity of a 1 per cent solution and is superior as a standard to the viscosity, being less dependent on the temperature than the latter, 1 degree causing a variation in the viscosity index of only 0.005. Hence it is not necessary in viscosity determinations to keep the temperature constant by means of a thermostat. The viscosity index multiplied by the factor 70 gives the tensile strength of the rubber sample. Gorter's viscosimeter consists of a pipette with a 10 cm. capillary stem with an opening 1.42 mm. in diameter, the whole fitting into a 150 cc. Erlenmeyer. The indicated capacity of the pipette is 15 cc., and its constant 9.8 at 26 degrees C. One gram of rubber is dissolved in 120 cc. benzene (not purified from thiophene) with shaking, using a brown flask. The solution is filtered after 24 hours and the concentration determined, after which the viscosity is determined by the pipette. The relative viscosity of a rubber solution equals the period of delivery, divided by the constant of the viscosimeter for the solvent used. The viscosity of a rubber solution is dependent on the dimensions of the viscosimeter used; hence to obtain comparable results the same instrument must invariably be used.

THE WEBER TEST FOR SUN CRACKING DEMANDS PRECAUTION.

D. S. Twiss in the "India Rubber Journal" sounds two important warnings in regard to the use of C. O. Weber's reagent.

The Weber test depends upon the partial oxidation of strips of rubber with a mixture of acetone and an aqueous solution of hydrogen peroxide. Although this mixture is said to keep unaltered for a long time, nevertheless there is a distinct possibility of its deterioration. While acetone-peroxide compound is very soluble in acetone and also other organic solvents, such as ether and benzene, it is only sparingly soluble in water, and because of the presence of water in the Weber mixture, crystals of the compound in a practically pure condition may gradually be deposited after a month or so, some of them continuing to float in the liquid. Of course, the separation of such a crystalline compound causes a diminution in the oxidizing power of the liquid reagent so that tests made with it on various dates may not be accurately comparable.

Great care should be taken to prevent the accumulation of any considerable quantity of these crystals in empty bottles or elsewhere, particularly in a dry condition. Despite the seeming harmlessness of the compound thus formed and the fact that it can even be melted at 97 degrees C., it is capable of exploding with frightful violence if subjected to a shock, or if heated above its melting point. One thousandth of an ounce, when heated in an open test tube, will explode with such force as to shatter the tube, and the explosion of a greater quantity in a large glass bottle would be exceedingly dangerous because of the flying fragments of glass. Obviously the practice of using a freshly prepared reagent not only insures accuracy but personal safety as well.

THEORY OF COLD VULCANIZATION OF RUBBER.

The following abstract of the researches of F. W. Hinrichsen and E. Kindscher on cold vulcanization is from the "Journal of the Society of Chemical Industry" (September 15, 1916).

According to C. O. Weber (in 1894) caoutchouc combines with sulphur chloride to form a series of compounds of which the richest member in sulphur contains 23.62 per cent. Measured quantities of a solution of purified Para rubber in dry thiophen-free benzene, were treated with quantities of a solution of sulphur chloride in benzene in excess of that corresponding to Weber's formula, and the reaction product was purified as described by Weber. In eight experiments the sulphur content found ranged from 15.58 to 28.37 per cent. In another series of experiments, quantities of the rubber solution containing 0.5 gram of rubber were treated with quantities of sulphur chloride solution containing from 0.433 to 1.299 grams S_2Cl_2, under conditions to exclude the presence of moisture, and after three or four weeks, portions of the solutions were withdrawn and analyzed. The amount of sulphur chloride fixed by the rubber ranged from 0.2526 to 0.2795 grams, corresponding approximately to the formula $(C_{10}H_{16})_2S_2Cl_2$. The higher results obtained in the first series are attributed to adsorption of sulphur chloride or of sulphur liberated therefrom. The yellowish-white addition compound of caoutchouc and sulphur chloride when boiled with alcoholic sodium hydroxide solution is converted into a dark brown substance corresponding to the formula, $C_{20}H_{30}S_2$. In the technical cold vulcanization process it is considered that adsorption of sulphur chloride by the rubber first takes place, followed by slow chemical combination and by liberation of sulphur from the excess of sulphur chloride. Cold-vulcanized rubber may thus be regarded as an adsorption product of sulphur in a solid or semi-solid solution of the compound, $(C_{10}H_{16})_2S_2Cl_2$, in excess of rubber.

METHODS OF ANALYSIS.

DETERMINATION OF PARAFFIN IN BLACK SUBSTITUTES.

A. HUTIN in "Le Caoutchouc & La Gutta-Percha" contributes the following method for the determination of paraffin and waxes in black rubber substitutes:

Many black substitutes contain paraffin, added intentionally in considerable proportions. Substitutes that contain from 10 to 30 per cent of paraffin break with a section showing small white spots, and are friable. If 30 per cent paraffin is present the mass is whitish. Below 10 per cent no such evidence is visible.

The method of C. W. Weber is used for the analysis of substitutes, modified as follows, for the determination of paraffin. The acetone extract, obtained as usual, is treated with 100 cc. of 97 to 98 degree alcohol: the mixture heated by plunging the container into boiling water and decanting the liquid on a tared capsule. This operation is repeated 5 or 6 times. Evaporate the liquid and dry residue to constant, and weigh.

Paraffin, ceresin and other waxes present are thus obtained together. In general, the material is white or pale yellow and composed of impure paraffin. It is necessary to use 98 per cent alcohol, otherwise the paraffin, etc., will not be wholly dissolved.

RUBBER SUBSTITUTE.

"Chemical Abstracts" (October 10, 1916) gives the following account of the method of H. Bayer (German patent No. 288,968, June 3, 1914) for the manufacture of an improved substitute for rubber. A rubber substitute is obtained from fatty oils, liquid at the normal temperature, as they are employed in the factice manufacture, by treating the balsam-like substance obtained by dissolving and heating sulphur in oil, with an energetic oxidizing substance (preferably dilute nitric acid). The product is soft in the heat, but elastic and tough when cold, and after washing it can be vulcanized with sulphur. The sulphur is at the same time oxidized, as evidenced by the presence of large amounts of sulphuric acid in the nitric acid. This mass is not completely soluble in any of the known solvents, but it swells up with carbon bisulphide, benzene and many other organic

solvents, to a gelatinous, doughy mass which, upon spontaneous evaporation, or evaporation with the aid of gentle heat, to remove the solvent, remains as a homogeneous, very tough and elastic product. This substance, alone or in admixture with solutions of resin, caoutchouc, gutta percha, etc., can be mixed with filling and variously colored. In the swollen state, this mass is mixed with 10 to 20 per cent pure flowers of sulphur, warmed gently, under pressure, on rolls, and, after evaporating the softening agent, it is vulcanized at a temperature slightly above the melting point of sulphur.

For example, 1 kilogram of linseed oil is heated with 150 grams of sulphur at 266 to 320 degrees F., until the sulphur has been completely dissolved, and the linseed oil has been converted into a black-brown liquid, which upon cooling, no longer separates sulphur. This liquid is poured into 3 to 4 times its weight of dilute nitric acid, and warmed for several hours on a water bath, with stirring, until the liquid has been converted into a yellow substance, soft when hot and elastic and tough when cold, and large amounts of sulphuric acid are present in the nitric acid. This product is washed thoroughly with water and dried in a thin layer at 212 to 230 degrees F. Of this mass 1 kilogram is worked up into a gelatinous dough with 200 grams asphalt and 200 grams flowers of sulphur, with the addition of benzene; then dried and vulcanized by heat. The final product is claimed to serve in many cases as a substitute for rubber, and to be much cheaper.

CHEMICAL PATENTS.

THE UNITED STATES.

REGENERATING VULCANIZED RUBBER. The process of regenerating vulcanized rubber which consists in comminuting the material, boiling it in an alkaline solution, and heating the entire mass of material in an atmosphere of inert gas to a temperature approximating but short of the melting-point, and continuously stirring the mass. [Bernadus Johannes Franciscus Varenhorst, The Hague, and Jean Gérard Fol, Delft, Netherlands. United States patent No. 1,198,975.]

THE UNITED KINGDOM.

SUBSTITUTE FOR RUBBER. A mixture of colophony, caoutchouc, sulphur, naphtha, dry white lead or Spanish white is prepared with heat and may be used for sealing wax or in place of ebonite. [R. Castells, 240, Provenza, Barcelona, Spain. British patent No. 7,703 (1915).]

RUBBER RECOVERY FROM RUBBERIZED FABRICS. Rubber is recovered from fabric impregnated with vulcanized rubber, by heating it with boiling tetrachloroethane. Solution of the rubber is complete in about one hour. After removing the fabric, the rubber is recovered from the solution by adding water and distilling off the solvent with the water; or the solvent may be distilled dry, provided care be taken not to overheat the rubber. If desired, the free sulphur may be removed by a short preliminary treatment of the rubberized fabric with hot tetrachloroethane, the operation being interrupted before the rubber begins to dissolve. [C. de Villers, Neuilly, France. British patent No. 10,146 (1915).]

COAGULATING LATEX. In contradistinction to the usual processes employed, the present invention consists in treating the latex with gases obtained by the destructive distillation of wood in suitable retorts, after removal of the tar from the gases.

The advantages of the processes are:

(1) The product obtained is better than that obtained by application of smoke.

(2) As fuel for the distillation of the wood, the charcoal from a preceding distillation can be used. Not all the charcoal, however, is required.

(3) The wood tar obtained forms a valuable product which is available on the plantation for conserving the plants against disease.

(4) The process is cheap. [E. C. R. Marks, 57 Lincoln Inn Fields, London, W.C., England. British patent No. 11,615 (1915).]

UTILIZING WASTE RUBBER. India rubber is removed from tire fabrics, without destroying them, by treatment in *vacuo* with a solvent, at a temperature which produces strong ebullition (212 to 230 degrees F. in the case of xylol). A circulating movement of the liquid is produced by a cone-and-tube device, similar to that used in laundry apparatus. The rubber is first stripped from the fabric by means of xylol or other solvent; the fabric is then treated with cold xylol in an ordinary washer to remove lightly-adhering rubber, resins and free sulphur; next the fabric is placed in a cage in an autoclave containing pure xylol. The autoclave is connected with a reflux condenser which has a pipe connection to a vacuum pump. After heating twice in the autoclave by a steam coil, the fabric is washed in clean xylol, again treated under pressure at about 150 degrees F., and finally washed, and centrifugally treated, dried by means of a current of inert hot gas, and bleached. The liquids containing rubber can be used for dissolving the granular rubber derived from the stripping of the fabric. [H. Debauge, 2 Rue de Penthievre, Paris, British patent No. 100,961.]

THE DOMINION OF CANADA.

RUBBER VULCANIZATION METHOD. The process of vulcanizing india rubber substance which consists in submitting the substance in the presence of sulphur, sulphides, or other vulcanizing agents, to the action of ultra violet rays, under a variety of conditions of heat, pressure or vacuum in solid films or in solution. [Gustave Bernstein, Chamaliers, Puy de Dôme, France. Canadian patent No. 170,142.]

RECOVERING RUBBER STOCK. The process of recovering rubber stock from vulcanized rubber which consists in bringing the vulcanized rubber in contact with a solution comprising resin and a material obtained by the action of dissolved resin on vulcanized rubber, and incorporating this solution with the comminuted vulcanized rubber and removing the solvent therefrom. [Hermann Goldman, New York City. Canadian patent No. 170,393.]

OTHER CHEMICAL PATENTS.

THE UNITED STATES.

1,200,296. Elastic material for use in tires. Maurizio Barricelli, Bygdö, near Christiania, Norway.

1,200,692. Hard rubber composition. Leo H. Baekeland, Yonkers, N. Y.

THE DOMINION OF CANADA.

171,032. Filler for tires. Frank A. Hager, Portland, Oregon.

THE UNITED KINGDOM.

8,487 (1915). Treatment of latex on scrap rubber. C. A. Ilcken, East Coast Road, and St. V B. Down, 43 The Arcade—both in Singapore.

101,127. Impregnating compositions of gutta percha, rubber or balata. E. C. R. Marks, 57 Lincoln's Inn Fields, London, England.

ANOTHER CHEMICAL EXPOSITION IN 1917.

Hardly has the Second National Exposition of Chemical Industries been closed when plans are forming for the third exposition, to be held next fall, and it is said that its success is already assured. An additional floor in the Grand Central Palace, New York City, has been engaged and plans are being made to use this, and possibly another, in addition to the first two floors which were occupied this year. Interesting details of the enlarged scope of the Exposition will appear in due time.

The New York State Industrial Safety Congress will convene at Hotel Onondaga, Syracuse, New York, December 11, 12, 13 and 14. Addresses will be delivered by experts on fire prevention, factory sanitation, safeguarding of machinery and other factors pertaining to industrial safety. Some of the evening lectures will be illustrated. Employers, superintendents and factory foremen are invited to attend.

The Ocotillo Rubber of Arizona.

ACCORDING to report, a San Francisco chemist has discovered that the candlewood shrub, or ocotillo, which abounds in the arid plains of Arizona and New Mexico, contains large quantities of a rubber-like or gutta-like gum, and a company has been incorporated in Arizona for the purpose of extracting this gum and placing it upon the market. The company is to lease nearly a million acres of land in Texas and is attempting to lease State lands in Arizona where the shrub is abundant. As to value of the gum commercially, one story is that it is suitable for the manufacture of chewing gum; another is that automobile tires have been made from it, and so on. Of course there are the usual statements to the effect that this discovery is to revolutionize the rubber industry. The possibility that the gum may have even a minor value leads us to give its pedigree.

THE OCOTILLO (*Fouquieria splendens*).
a, chalice and pistil; *b*, corolla; *c*, stamen.

The ocotillo (*Fouquieria splendens*) grows wild from northwest Texas, through New Mexico and Arizona to Southern California, thence south to Lower California and the Mexican States of Coahuila, Chihuahua and Sonora. It is variously known as the vine cactus, coach whip, Jacob's staff and candlewood. In its wild state the shrub grows from 6 to 20 feet high, sparingly branched from the base, the branches up to an inch in diameter, branchless and apparently leafless, their swaying tips brilliant with scarlet blossoms—the flame of the "candle."

The branches are covered with thorns or spines. These are the petioles of the leaves. Like many other desert plants the candlewood has but few leaves, which soon dry and shrivel, and finally fall away, leaving only sharp thorns about an inch long, thus incorrectly classing it as a cactus. It is easily propagated from cuttings, and is much used in Mexico to form an impenetrable hedge. The long, slender stems are used as the substratum over the beams which hold up the grass and clay roofs of adobe houses. It is stated that as much as 400 tons of shrub can be taken from an acre, and that new growth on that acre will reach maturity in three to five years. It has been known that the ocotillo (to use its Mexican name) yields a resin, a wax and a gum. It is this latter which is now pronounced valuable in the chewing gum business and the rubber industry. A company has been organized for the purpose of extracting it from the bark of the plant by a patented process

Of much local interest in the city of Phoenix, Arizona, was the "Arizona Tire, a Product of Ocotillo Gum." This was manufactured by the W. C. Hendrie Rubber Co., Torrance, California, and displayed in the show window of a local dealer. That doubters may be forestalled in their unbelief E. W. Snyder, superintendent and chemist of the Sunset Rubber & Supply Co., Los Angeles, California, subscribes and swears before a notary public that:

The tread in this tire is scientifically compounded from ocotillo gum, smoked sheet rubber, sulphur, zinc, white lead, litharge and other compound ingredients commonly used in the manufacturing of automobile tire treads.

As to the great general usefulness of the gum he writes, addressing the Arizona Chicle Gum Co., Mesa, Arizona:

After carefully testing out ocotillo gum, I find that it has a commercial value in the greatest of all industries—the tire business. It is a very valuable ingredient for hose, belting and tire frictions, immense quantities of which are manufactured throughout the world. The guayule industry has become one of the leading industries of the rubber business and has proven to be very profitable. The ocotillo gum has a greater field because it

THE OCOTILLO IN ITS DESERT HOME.

can be successfully used in many other commercial lines. With my experience as a chemist and a practical rubber man, I can give ocotillo gum nothing but the very highest praise.

An interesting point brought out by Judge W. H. Stilwell of Arizona is thus stated:

It is not unreasonable to suppose that rubber produced in this country will meet the demands of the climate and elements more successfully than rubber produced elsewhere.

J. D. Crawford, whom "Arizona" describes as an American chemist and wage earner in the rubber industry, is given the credit of the discovery of the ocotillo as a rubber producer. Mr. Crawford, so says "Arizona," discovered the value of guayule and "sold his processes to the Madero brothers for a small consideration." His discovery of guayule is 18 years old, that of ocotillo is 3 years old.

The plan of the Arizona Chicle Co. is not to manufacture either chewing gum or automobile tires. Instead it will extract the gum and sell first to manufacturers of the articles named and later to any and all who find the gum of use. The initial plant is planned for a daily capacity of 600 tons.

H. E. Shrum, of Phoenix, Arizona, who has charge of the sale of stock, kindly sent the editor of THE INDIA RUBBER WORLD a small sample of the bark of the ocotillo plant and a piece of vulcanized rubber. Whether this was a bit of the tire compound cited above does not appear. He further stated that the company expected to be producing gum by the first of the year. As to the cost of the gum, it is stated that it can be produced in quantity for 10 cents a pound.

If this project proves successful in adding to the sources available for the production of rubber, or even plastics from plants indigenous to our own country, it will certainly be well worth while. Perhaps this desert "cactus" may become as valuable as the once neglected guayule shrub which has proven of such substantial use in the rubber industry.

In the meantime the rubber trade awaits with interest elucidation of the following points:

FIRST—What percentage of ocotillo gum entered into the composition of the "Arizona" tire.

SECOND—Would it be possible to make a tire or anything else in rubber using ocotillo gum, and compounding and curing it without the addition of "plantation sheet" or any other rubber?

A frank answer to both of the above will tell the story of the value of the gum beyond peradventure.

RUBBER GLOVES FOR X-RAY SURGICAL OPERATIONS.

Rubber gloves for surgical operations where X-rays are used are made opaque to these rays by being impregnated three or four times, at intervals of about a half hour, with a paste obtained by thoroughly mixing the following ingredients in a chemist's mortar:

100 grams finely ground lead carbonate.
50 grams of rubber solution (similar to solution used for repairing cycle tires).
50 grams of light mineral oil.

Large size surgeon's gloves need from 40 to 50 grams of paste each; the paste is applied with a soft brush, preferably on the interior surface of the gloves, the latter being turned inside out and filled with talc or a similar powder. The paste adheres better when the surface has been coated beforehand with diluted rubber solution.

This paste is not affected by prolonged contact with water containing phenol, nor by strong alcohol, but it blackens if the gloves are placed in boiling water for any length of time, and then it develops a tendency to crack when the gloves are stretched in any way.

In French military hospitals many doctors coat their hands with the paste above described before putting on their rubber gloves. The paste can be easily washed off by using mineral oil. ["Journal de Pharmacie et de Chimie."]

THE ELECTRICAL EXPOSITION.

FOR two weeks in October the Electrical Exposition and Motor Show of 1916 was held in the Grand Central Palace, New York City. As in previous similar exhibitions, this served to show the progress in electrical achievements during the year, many exhibits being particularly interesting and attractive. Out of a total number of 105 exhibitors there were some which were more or less related to the rubber industry. Among these might be mentioned the following:

The Habirshaw Electric Cable Co., Yonkers, New York, exhibited a very complete line of samples of rubber insulated cables, including the large armored cable made for the Interborough Rapid Transit Co. and laid under the Harlem River; and a sample of the submarine cable made for the Signal Department of the United States Government. This cable was made and tested at the Habirshaw works in one piece, 34 miles long, which is now in service in the Philippines.

The Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pennsylvania, exhibited a large number of electrical devices for the modern residence, office and factory. Electric fans, motors, transformers and rectifiers for charging storage batteries were also shown, as well as lightning arresters for the protection of electrical circuits, lighting fixtures for street use, and motors for various industries.

The General Electric Co., Schenectady, New York, showed the modern application of its Mazda lamps, of various capacities. A mechanical display showed exactly what the consumer gains by the use of these over other lamps, as demonstrated by the use of a mechanical meter. An electrically lighted fountain, an electrical clock, a reproduction of a modern show window illuminated with miniature lamps, X-ray plates, motors, generators and transformers completed the exhibit.

The Electric Storage Battery Co., Philadelphia, Pennsylvania, displayed a large number of storage batteries of its manufacture, those used in submarine vessels, in electric vehicles, in mine locomotives, and also for central lighting and power stations for telegraph and telephone service. There were also various batteries used for automobile starting and lighting, wireless telegraphy, fire alarm and gun firing.

Another storage battery was the "Edison," shown by the Edison Storage Battery Co., Orange, New Jersey, which is used in a great variety of ways for lighting and motor power in vehicles, boats, etc., and for supplying current to modern searchlights, telegraph, telephone, time clocks and light machinery. The Edison electric safety mine lamp was also shown.

The New York Edison Co., New York City, showed the work of its various bureaus in a very comprehensive exhibit, demonstrating the capabilities of its service. For instance, there was a completely equipped electrical hospital, an X-ray room, an electro-mechanical gymnasium, a dental hospital, and a photographic studio. A three-room apartment, in miniature, was shown, furnished with figures, furniture and electric fittings, all arranged to show the different lighting effects.

The vacuum cleaner would be far from practicable were it not for the rubber hose which gives it portability. The Frantz Premier Co., Cleveland, Ohio, and the Hoover Suction Sweeper Co., New Berlin, Ohio, had exhibits of these machines. Rubber tubes form a part of the electrical milking machines which were seen in operation in the Dairy division, several prize Guernseys and Holsteins being exhibited by a well-known condensed milk company.

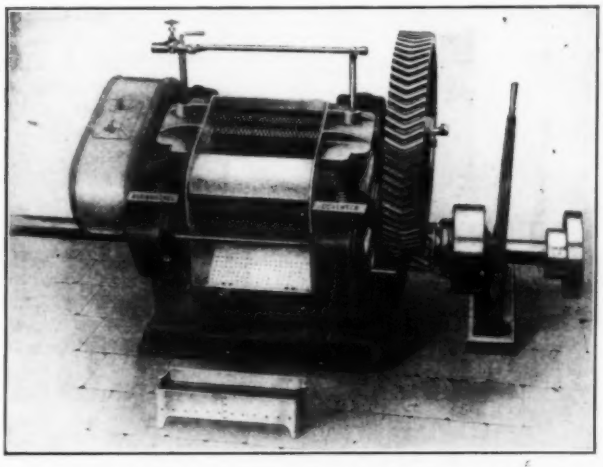
The S. S. White Dental Manufacturing Co., Philadelphia, Pennsylvania, among other items of its exhibit of a modern dentist's office, showed an electrically heated rubber tube for conveying the gas administered to patients at about the temperature of the body, thus lessening excitement and irritation. Prepared rubber and rubber dam for dental purposes were also shown.

New Machines and Appliances.

A DUTCH TYPE TWO-ROLL PLANTATION WASHER.

MACHINERY builders in Holland are keeping pace with the ideas of modern design and construction of rubber washing machines. The illustration clearly shows a strongly built, standard machine that is capable of giving durable service.

The heavy, cast iron bed-plate is of the one-piece pattern and supports the side frames in which are mounted the journals for



the two rolls. These are made of deep chilled iron, measuring 12 by 18 inches, accurately turned and diamond corrugated. The adjustable roll is taken up by two powerful screws mounted in the side frames and operated by a cross shaft and hand wheel. Provision is made to prevent oil from coming in contact with the rolls.

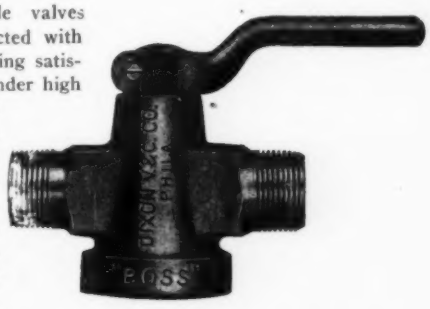
The machine is underdriven and controlled by a lever friction clutch tested to stand 18 horse-power. It is driven by a steel pinion on the main shaft that meshes with the main gear keyed to the back roll. Both gears are of the double helical cut type and a safety screw prevents breaking of the gear teeth when subjected to unusual strain. The front roll is driven by gearing from the back roll, and a cover that completely encloses both gears prevents accidents. A perforated pan is provided for catching the rubber as it passes between the rolls, and a strainer box retains the smaller particles that fail to mass.

The machine weighs 5,000 pounds and when packed for shipment measures 61 by 55 by 48 inches, and an additional crate measures 92½ by 7¾ by 7¾ inches. [J. L. Nering Bogel & Co., Deventer, Holland.]

HIGH PRESSURE COUPLINGS AND THROTTLE VALVES.

Reliable hose clamps and dependable throttle valves are indispensable equipment where high pressure strain or compressed air is used. A clamp that will not blow off under high pressure or give way through long service is essential. Such are the claims made by the manufacturer of "Boss" couplings. Its parts are few, comprising spud, stem, nut and clamp,—the long stem affording ample hose-gripping surface and the dovetail clamp accommodating a variety of outside hose diameters. For hose with extremely thick walls or with woven cotton cover, special clamps are furnished.

"Boss" throttle valves are also constructed with the object of giving satisfactory service under high pressure and rough usage. The walls are extra heavy and the thread shoulders reinforced to withstand unusual strains. While operating freely, these valves will not close nor open by vibration. [Dixon Valve and Coupling Co., Philadelphia, Pennsylvania.]



COMBUSTION STOVE FOR SMOKING RUBBER SHEET.

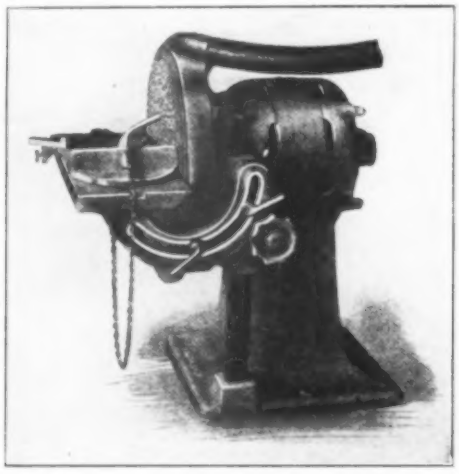
There are various methods and appliances used in smoking rubber that has been prepared in the form of sheets. On most plantations the smoke is applied externally to the rubber that is suspended on racks or poles in a smoke house. The stove shown in the illustration produces clean, sparkless smoke by the combustion of wood, cocoanut husks or similar material. It is strongly constructed of metal and supported by four legs. The fuel chamber, which occupies the lower part of the stove, is provided with grate bars, draft regulating slide for controlling the volume and temperature of the smoke, and a fuel charging door. The upper part of the stove contains the spark arrester, which retains and precipitates all solid substances in the smoke. Ash trays are provided that may be easily lifted off, that their contents may be emptied at intervals. The smoke outlet at the top is designed to fit an ordinary 5-inch stove pipe. [United Engineers, Limited, Ipoh, Federated Malay States.]

THE PIONEER DUSTLESS GRINDER.

The self-contained motor driven grinding machine here shown has several features that doubtless would find favor and practical utility in a rubber factory, not only in the machine shop and pattern room, but, for example, in smoothing off the fin that is left after trimming molded goods, and also rough grinding hard rubber articles with plain surfaces.

The machine is adapted to be placed on a bench within easy reach, and starts at full speed by the touch of a button. It is provided with a vacuum dust collecting system that carries the dust to a removable settling pan located in the column of the machine. The tilting table is equipped with a graduated adjustable angle gage, operated by a small hand wheel. Locking levers are provided to hold the table firmly in any position, while the entire mechanism is supported on a square column upon which it

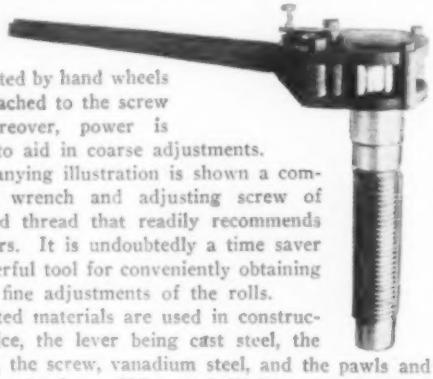
is adjusted vertically. The following are the particulars: Diameter of disk, 9 inches; base, 9 inches square by 8 inches high; height over all, 15 inches; table, 4½ by 11½ inches; vertical



adjustment, 4½ inches; angle adjustment, 15 degrees upward, 45 degrees downwards; single-phase, 60 cycle, 220 volt motor. [The H. A. Smith Machinery Co., Syracuse, New York.]

M. & W. RATCHET WRENCH AND ROLL ADJUSTING SCREWS.

Adjustment of the rolls of heavy washers, mills and refiners is a matter that requires force and considerable skill. The powerful screws controlling the roll adjustments are usually operated by hand wheels or bar levers attached to the screw heads and, moreover, power is sometimes used to aid in coarse adjustments.



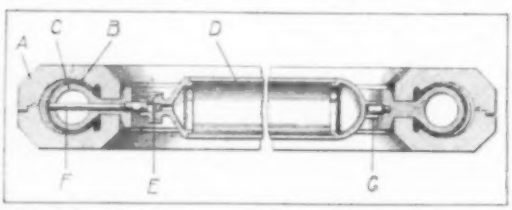
In the accompanying illustration is shown a combination ratchet wrench and adjusting screw of standard size and thread that readily recommends itself to mill users. It is undoubtedly a time saver as well as a powerful tool for conveniently obtaining both coarse and fine adjustments of the rolls.

Carefully selected materials are used in construction of this device, the lever being cast steel, the cover plate, steel, the screw, vanadium steel, and the pawls and shifter levers, drop forgings. [Morgan & Wright. Detroit Rubber works, Detroit, Michigan.]

MACHINERY PATENTS.

GAMMETER'S INTERNAL PRESSURE VULCANIZING APPARATUS.

Hollow rubber articles are cured while subjected to internal fluid pressure, according to this invention, which is here illus-



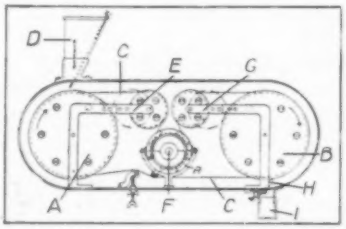
trated and described, as applied to the making of tire casings. The drawing is a cross-section of a two-part tire mold *A*, showing casing *B*, core *C*, and the round flask *D*, containing carbon dioxid.

The flask is charged in a separate apparatus and a fusible plug *E*, inserted. One end of the flask is connected to the pipe *F* that conveys the gas under pressure to the space between the core and the casing. The other end of the flask is supported by a stud *G*.

The heat of the steam immediately melts the plug and releases the gas, which applies pressure to the inner part of the casing during vulcanization. [John R. Gammeter, Akron, Ohio, assignor to The B. F. Goodrich Co., a corporation of New York. United States patent No. 1,200,603.]

ULTRA-VIOLET RAY VULCANIZER.

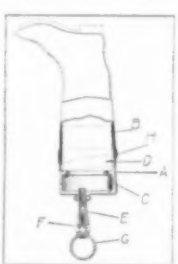
Solutions of india rubber are vulcanized by ultra-violet rays, care being taken that the operation is not continued sufficiently long to injure the rubber. The sulphur employed may be replaced by any sulphide which is decomposed by the rays; for example, carbon, allyl, or antimony sulphide. Very dilute solutions of the vulcanized rubber thus obtained; for example, 0.5-0.6 per cent, may be used for cementing, and only a very thin cementing layer is required. A maximum of 1.25 per cent is claimed. The illustration is a sectional side elevation of the apparatus, which may be employed for treating any liquid or solid product in thin layers with ultra-violet rays.



It is an enclosed machine supported by suitable standards, and underdriven by a longitudinal shaft located on one side of the casing. Keyed to the shaft is a worm that engages a worm wheel driving the drum *A*, which also drives the opposite drum *B* by sprocket gearing. The endless belt carrier *C* passes around these drums and is driven by them. The product to be treated being introduced through the hopper *D*, is carried by the endless belt over the adjustable guide roller *E*, down and all around the quartz mercury vapor lamp *F*, then over the adjustable guide roller *G* and around the drum *B*. The material is removed from the belt by a scraper *H* and delivered to a receptacle *I*. [H. P. M. A. Olivier, Paris, France. British patent No. 7,823 (1915). Not yet accepted.]

APPARATUS FOR EXHAUSTING THE INTERIOR OF RUBBER ARTICLES.

In many processes of pressure cure, as applied to the manufacture of boots and shoes, hollow perforated forms of special construction are used. The present invention, however, provides a device that permits the use of solid forms or lasts such as are commonly used in footwear manufacture. The accompanying drawing is a side elevation partly in section, showing this device applied to a solid boot form.



The metal cap *A* is adapted to fit over the boot form *B*, and comprises a vacuum chamber *C* and a tapered, wedge-shaped conduit *D* which separates the boot from the form and establishes communication between the inner surface of the boot and the vacuum chamber.

The metal cap is provided with a tapered nozzle *E* that fits over a tapered nipple *F* and low pressure or a vacuum is supplied from the pipe *G*. A seal *H* laps the edge of the boot to insure a tight joint during application of the preponderating outside pressure. [Chester J. Randall, assignor to The Goodyear's Metallic Rubber Shoe Co., both of Naugatuck, Connecticut. United States patent No. 1,199,420.]

OTHER MACHINERY PATENTS.

THE UNITED STATES.

1,198,790. Collapsible former for building tire casings. J. D. Tew, Akron, Ohio.

1,198,874. Mold for manufacture of rubber thread-loops. T. Sloper, Devizes, England.

1,198,875. Pressure applying vulcanizing mold. T. Sloper, Devizes, England.

1,198,932. Repair vulcanizer. A. E. Lawrence, San Marcos, assignor of one-half to N. Hanke, Hays County—both in Texas.

1,199,314. Automatic device for coating the constituent elements of a laminated cohesive interwound band. L. A. Subers, East Cleveland, Ohio.

1,199,449. Machine for making plastic articles. W. J. Burns, assignor to The Peerless Vulcanite Co.—both of Bridgeport, Conn.

1,199,674. Demountable rim tool. H. M. Du Bois, assignor of one-half to N. W. Du Bois—both of Houston, Texas.

1,200,009. Repair vulcanizer. V. B. Nelson, assignor to National Lock Co.—both of Rockford, Ill.

1,200,014. Tire bead placing device. M. Paridon, assignor of one-half to H. A. Rudd—both of Barberton, Ohio.

1,200,016. Tire building machine. M. Paridon, assignor of one-half to H. A. Rudd—both of Barberton, Ohio.

1,200,070. Rubber mill. F. H. Banbury, East Orange, N. J., assignor to Birmingham Iron Foundry, Derby, Conn.

1,200,183. Dental vulcanizer. G. B. Fraley, Liberty, N. Y.

1,201,190. Demountable rim tool. J. Johnson, Perryville, assignor of one-half to T. A. Son, Bonne Terre—both in Missouri.

THE DOMINION OF CANADA.

170,643. Cementing machine. The United Shoe Machinery Co., of Canada, Limited, Maisonneuve, Quebec, Canada, assignor of M. F. Brogan, Lawrence, Mass.

170,938. Tubing machine feeder. The Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, Canada, assignee of G. F. Fisher, Roselle, N. J.

THE UNITED KINGDOM.

7,491 (1915). Making double texture knitted fabrics. T. Adams, Limited, Stoney street, and W. R. Westmoreland, 10 Regent street, New Basford—both in Nottingham.

7,643 (1915). Tire tool. R. McMullan, 9 Rathcool street, Belfast, Ireland.

7,960 (1915). Latex coagulating machine. A. Woosnam, 10 New Court, Lincoln's Inn, London.

8,075 (1915). Pneumatic tire mold. F. A. Byrne, 2 Ludgate Hill, Birmingham.

*8,524 (1915). Electric repair vulcanizers. O. C. Dennis, Cuyler avenue, Chicago, Ill.

8,643 (1915). Making non-skid studs. C. G. Renold, and H. Renold, Limited, Burnage Works, Didsbury, Manchester.

8,757 (1915). Coating fabrics. A. Olier et Cie, Usines St. Rémy, Clermont-Ferrand, Puy de Dôme, France.

NEW ZEALAND.

*37,589. Portable repair vulcanizer. A. B. Low, 89 South Broadway, Denver, Colo.

THE FRENCH REPUBLIC.

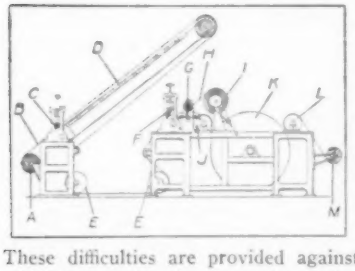
*480,190 (November 9, 1915). Improvements in apparatus for manufacturing rubber footwear. Boston Rubber Shoe Co.

* Denotes patents for American inventions.

PROCESS PATENT.

METHOD OF MAKING DOUBLE TEXTURE FABRICS.

The manufacture of double texture fabrics is a particularly difficult process when one of the fabric layers is thin or loosely woven, as is the case with mohairs employed in automobile tops.



According to the usual method, the pressure necessary to effect proper adhesion results in forcing the solution through the thin fabric so that it appears on the face; morever, the pressure mats down the surface and destroys the mill finish of the goods. These difficulties are provided against by the present method, which is described in connection with the accompanying illustration of a spreading machine.

From the supply roll *A*, the fabric *B* passes under the spreading knife *C*, which distributes a thin coating over the upper surface. The fabric then passes around the drying table D, and down and around idler rollers *E* to a second spreader *F* that applies to the coated surface a thin film of highly adhesive rubber solution. Before this is dry the fabric is passed under pressure roller *G*, where it meets and is superposed by the face fabric *H* fed from supply roll *I*. The double fabric then travels around a guide roller *J*, the heated drum *K* and the guide roller *L*, to the tensioned wind up roller *M*. [James Meade, Stoughton, Massachusetts. United States patent No. 1,199,400.]

OTHER PROCESS PATENTS.

THE UNITED STATES.

1,199,249. Fibrous rubber material for use in the manufacture of waterproof sheeting, tubing and the like. J. W. H. Dew, London, England.

1,199,922. Rubber article and process of making same. R. B. Price, New York City, assignor to Rubber Regenerating Co., Mishawaka, Ind.

THE UNITED KINGDOM.

7,477 (1915). Endless bands of canvas and rubber. T. Sloper, Southgate, Devizes, Wiltshire.

THE FRENCH REPUBLIC.

*480,402 (December 7, 1915). Improvements in processes to suppress porosity in rubber goods. Boston Rubber Shoe Co.

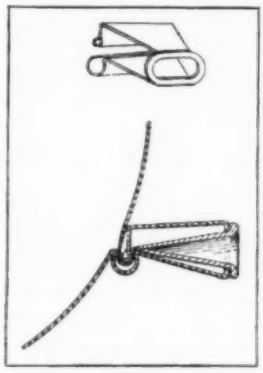
THE GERMAN EMPIRE.

288,418 (May 12, 1914). Horse-hair net is worked up with rubber to impart strength to it. E. Frorz.

MISCELLANEOUS PATENTS.

TOY BALLOON VALVE.

A device for closing the air or gas inlet to toy balloons, punching bag, or football bladders, and other inflatable articles of rubber, is the subject of this invention. This metal closure device



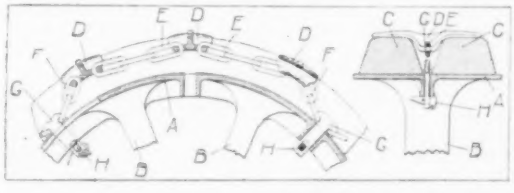
is made in one piece, comprising two flat plates positioned one over the other and joined at one end, forming the mouth-piece. The free end of the lower plate is formed into a pocket, into which the flange provided at the end of the upper plate may be depressed. The neck of the deflated balloon or bladder is slipped between the two plates and through the mouth-piece, over which it is lapped. As soon as the article is inflated the plates are compressed, forcing the neck of one into the pocket of the other, and thereby closing the air passage. [Robert Head, New York City, assignor to Howe-Baumann Balloon Co., Newark, New Jersey. United States Patent No. 1,201,045.]

FRENCH TYPE CHAINS FOR DUAL SOLID TIRES.

A recent French patent covers articulated, detachable non-skid chains for motor vehicles equipped with dual solid tires.

This chain comprises a series of non-skid plates connected by chain sections with special links provided at regular intervals for fastening the chain to the rim of the wheel. The chains occupy the annular space between the dual tires as shown in the diagram.

The drawing on the left is a circumferential section and on the right, a transverse section of the wheel. *A* is the rim, *B* the



spokes, *C* the tires and *D* the non-skid plates that are connected by chain sections *E*. These sections are anchored by short chains *F* to double links *G*, located at spaced intervals in the rim between the dual tires. The links are fastened in the rim by taper keys *H*, that are held in place by straps or cotter-pins. [Société Schneider & Cie. French patent applied for February 29, 1915.]

Editor's Book Table.

STRAIGHT AMERICA. A CALL TO NATIONAL SERVICE. By Frances A. Kellor. The Macmillan Co., New York City. [200 pages.]

THIS book contains much interesting matter well worth the attention of every citizen of the United States. Its scope is defined by the following extract from a prefatory letter written by Ex-President Roosevelt. It says: "Emphasis is rightly laid upon the need of nationalism in all of the big questions of the day, from education to industrialism, for we cannot have a real American citizenship unless that citizenship is emphatically national. We cannot deal with immigration, unless we deal with it from the standpoint of a national Americanism. We cannot solve our industrial questions, especially the question of transportation, including all questions of interstate industrial enterprise engaged in manufactures and commerce, except from a national standpoint."

OFFICIAL AMERICAN TEXTILE DIRECTORY, 1916. COMPILED by the Textile World Journal. Bragdon, Lord & Nagle Co., New York City. [Flexible cloth covers. 8vo, 650 pages. Price, $2.]

This directory, which is published annually, gives a large amount of valuable information regarding the textile industry of the United States. This comprises nearly 7,000 establishments, including not only cotton, woolen, silk, flax and jute mills, but establishments devoted to dyeing, finishing, bleaching, printing and other branches of the textile industry. Full information is given regarding each of these mills, the names of officers, agents, superintendents, and the character of the goods made, and such other items as the number of spindles, looms, whether the mill uses steam or water power, etc. The book is arranged geographically, alphabetically, and according to style of goods manufactured, and will undoubtedly be found extremely useful to all engaged in these industries.

AUTOMOBILE NOMENCLATURE. THE SOCIETY OF AUTOMOBILE Engineers, New York City.

Confusion frequently arises from lack of uniformity in naming and describing parts of automobiles, and one of the objects of the Standardization Committee has been to decide upon the terminology for universal use in such descriptions. The report of this committee gives a list recommended by the Society of Automobile Engineers which contains over 600 separate names of the more important parts, this list being developed through the combined efforts of engineering and service representatives from a number of the leading automobile manufacturers. Undoubtedly it will serve to prevent confusion and to enable automobile owners, dealers and manufacturers to more accurately and thoroughly understand exactly what is meant by various terms.

HENDRICKS' COMMERCIAL REGISTER OF THE UNITED STATES for Buyers and Sellers. S. E. Hendricks Co., Inc., New York City. [4to, 1,738 pages. Price $10.]

With the present number, this standard publication rounds out a quarter of a century of usefulness. The work is especially devoted to the interests of the architectural, contracting, electrical, engineering, hardware, iron, mechanical, mill, mining, quarrying, railroad, steel and kindred industries, containing about 350,000 names and addresses, with upward of 45,000 business classifications. These lists contain the names of concerns handling the various products of these industries from producer to retailer. An innovation is a list of trade names, brands and titles of identification, this portion of the book being printed on a tinted paper, so as to be easily and quickly identified by the user, and numbering 202 pages, or in the vicinity of 10,000 names. This list includes many trade names of specialties manufactured of rubber. Automobile and motor car names are given in a separate list in another portion of the book. The book will be found of value to buyers of the various classes of goods and materials in the industries of which it treats.

GREEN MANURES AND MANURING IN THE TROPICS. BY P. de SORNAY. Translated into English by F. W. Flatteley. John Bale, Sons & Danielsson, Limited, London, England. [Large 8vo, 466 pages. Price, 16*s.* net.]

In India, Malaya and the West Indies and throughout the tropics and sub-tropics generally, the question of manuring is an important one. This book which treats the cultivation of the *Leguminosæ* crops, is one which gives much information regarding this special method of feeding nitrogen to the soil. Many queries are answered in this book, which will enable the planter to solve some of the difficulties of enriching the soil. The work will be found helpful to those who would learn how to cultivate legumes, either for seed and oil, fodder, cover-crops, or as green manures. There is a very complete index and also a table of French and English equivalents which will be found useful for reference.

INDUSTRIAL ACCIDENT PREVENTION. ISSUED UNDER THE direction of the Industrial Commission, New York State Department of Labor. [54 pages.]

The Industrial Commission of the State of New York has issued a pamphlet which gives in condensed form a vast amount of information regarding industrial accidents and many suggestions for their prevention. The causes of such accidents being given, such precautions are suggested as mechanical guards, industrial hygiene, prevention of fatigue of employes, their welfare and safety, education of illiterate workmen, and the advertising of safety by various means, such as bulletin boards, pictures, danger signs, letters in pay envelopes, books of rules and moving pictures. Workmen's committees are advised for seeing that safety suggestions are carried out, and education in first aid to the injured is also advised. The book is one which will be advantageously read by every employer of labor.

A NEW RUBBER PLANTERS' JOURNAL.

"The Netherlandsch Indisch Rubbertijdschrift" (The Netherlands India Rubber Journal) is a new bimonthly publication devoted to the increasingly important rubber problems of Holland and her colonies. The new bimonthly is under the management of K. L. F. Goelst, and W. J. Van den Leemkolk, and is published in Batavia, Java. It is the first paper devoted to this industry to be published in the Dutch East Indies, and is the official organ of the Rubber Planters' Association there.

The contents are largely signed contributions from practical men in various branches of the rubber industry. There are essays on selection of seed, planting, tapping, cultivation, diseases of *Hevea*, coagulants, accelerators, vulcanization, besides general articles on the future of planting in the Netherlands Indies, and profits and losses in management. The market and statistical departments are very comprehensive, and here the Dutch headings are supplemented by English translations, to render this information more widely available. The new publication starts out with an excellence which bespeaks for it a useful and prosperous future.

PAN-AMERICAN MAGAZINE RUBBER ARTICLES.

The "Pan-American Magazine," New York City, for September has finely illustrated articles on "The Rubber Industry of the Amazon" and "Impressions of Manaos," both by L. E. Elliott, F.R.G.S., together with an article on "Old Travelers on the Amazon," the last-mentioned relating to the explorations of early travelers in the first half of the nineteenth century.

NEW TRADE PUBLICATIONS.

THE General Electric Co., Schenectady, New York, is sending out Bulletin No. 44,419, which is devoted to gears and pinions. It is of the usual excellence of the publications on trade matters sent out by this company, being fully illustrated, giving much information regarding the manufacture of gears, the technical requirements, and diagrams showing comparative sizes of gear and pinion teeth, graphically shown in exact size.

* * *

The Firestone Tire & Rubber Co., Akron, Ohio, has sent to all its agencies a novel window hanger, showing, in a tabulated arrangement, the prices of its leading sizes of tires. The hanger is about 20 by 25 inches, printed in brilliant colors, and the figures are large enough to be easily read from a distance.

* * *

"Bulletin Sales Service" published by the Faultless Rubber Co., Ashland, Ohio, dated October, 1916, gives full plans for an opening celebration which may be put in operation by any druggist with such assistance as is afforded by the Faultless company. Full details are given as to the advertising, both in the local newspapers and in the stores, and for the latter purpose printed matter, window cards and prize tickets are furnished, suggestions being given regarding combination offers and free souvenirs which have been found practicable and not too expensive where others have held similar openings. Pictures and descriptions are given for arranging attractive rubber goods window displays and a reproduction of an advertisement is shown which will appear in a large number of national magazines during November, and the advice is to hold the opening on November 11, thus taking advantage of such advertising.

* * *

The J. P. Devine Co., Buffalo, New York, is distributing its Bulletin 105, which treats of apparatus required by the chemical and allied industries. The booklet gives in detail such apparatus as cast steel autoclaves, reduction kettles, nitrating, sulphonating and fusion kettles, vacuum pans and evaporators, steam jacketed pans, digestors, etc. Like all of the Devine publications, it is excellently arranged and beautifully printed, each page showing a finely drawn illustration of the article described.

* * *

The Link-Belt Co., Chicago, Illinois, has issued two finely printed and illustrated pamphlets describing the modern coal and ashes handling machinery which that concern has recently installed for the Victor Talking Machine Co. at Camden, New Jersey, and for the W. H. Grundy Co., Bristol, Pennsylvania.

* * *

"A Visit with the Firestone Organization, Its Men—Its Factory—Its Branches" is the title of a large, handsome and profusely illustrated brochure recently issued, primarily to show the progress in method and machinery which has helped so materially toward giving the utmost in tire service at the lowest possible cost. Nor has the personal equation been forgotten in this review. Firestone success depends upon the health, happiness and personal responsibility of every worker in the organization from H. S. Firestone down to the office boys, quite as much as upon improved machinery and scientific management, and so considerable space has been devoted to the operatives in the various departments, both at work and at play. They have a splendid club house across the street with assembly hall and dining rooms, a barber shop, swimming pool, facilities for the enjoyment of every healthful indoor exercise and recreation, free medical and dental treatment and several other benefits.

Beginning with the man who alone controls the unloading of coal and feeding of a battery of boilers of 12,000 horse-power capacity, one is shown by word and picture the efficiency methods and devices at every point in the making of a motor car tire which have made Firestone quality, prices and volume of business what they have become in 16 years. Painstaking thoroughness and rigid standards are everywhere to be seen—in the purchase of all raw materials; the washing of crude rubber; the supply of filtered water and filtered air always at proper temperature; ample drying of the sheeted rubber; careful mixing; proper aging of the mixed rubber before use; calendering more than once for thin sheets; constant inspection and frequent tests of sheet rubber and fabric; exact cutting of side wall rubber to size and of fabric on the bias to insure greater strength and resiliency; absolute uniformity of vulcanization; thorough inside painting of cases and a rigid final inspection. Firestone rims and truck tires are also produced in the same thoroughgoing manner, according to standards laid down by a body of skilled chemists and engineers.

The importance and method of scientific drying and frictioning of the fabric to extract all atmospheric moisture without impairing the natural tensile strength of the cotton before filling with rubber are particularly emphasized, while the tire building machine which puts on every layer of fabric at uniform tension has been properly termed an epoch-making invention. Indeed, the volume, the precision and the output would be impossible without the varied and wonderful types of improved machines which work in large batteries under the watchful eyes of men of superlative skill, experience and loyalty.

* * *

The B. F. Goodrich Co., Akron, Ohio, has published a pamphlet, entitled, "Devices That Make for Motor Truck Efficiency," which is a reprint of a portion of the larger book, "Motor Trucks of America," the edition of which was exhausted before all requests for it could be filled. The pamphlet shows various auxiliary devices for loading, whereby the trucks can be quickly loaded, carry much and deliver expeditiously. Clear and explicit drawings illustrate these various devices.

* * *

The Pennsylvania Rubber Co., Jeannette, Pennsylvania, is sending to dealers a large four-page folder, describing in particular the merits of the company's latest automobile tire—the Bar-Circle. The cover shows a representation of this tire, which, as the name indicates, has a tread design composed of alternate bars and circles; the descriptive lettering being in contrasting colors. Within the folder, red and black lettering against the cream background brings the advertising matter into striking prominence, and the tread design is carried out as a border. The Vacuum Cup and Ebony treads are also shown. Prices on the Bar-Circle are given, and an order post-card is attached to the folder by sealing at one end.

* * *

The Brunswick-Balke-Collender Co., Muskegon, Michigan, is sending out its first piece of trade literature to advertise its Brunswick tires. This is a handsome hanger, lithographed in several brilliant colors and measuring about 24 by 36 inches. The principal figure is a huge tire showing the novel tread. In one corner is a picture of an English style country house in front of which stands an automobile. The shield trade-mark is also shown in red and yellow, with an Old English initial in black. Appropriate wording is given and the whole forms a brilliant and effective piece of advertising.

* * *

"Oral Hygiene," a neat little journal devoted to the dental profession, in its October issue, has a long article telling of the work done by the Forsyth Dental Infirmary in Boston, Massachusetts, for the members of the Massachusetts militia prior to their departure for the Mexican border. The article shows several illustrations of the infirmary, and the dentists operating upon the army men, and in one picture is shown the founder of the institution, Thomas A. Forsyth, president of the Boston Belting Co.

Interesting Letters from Our Readers.

THE MECHANICAL RECLAIMING PROCESS.

TO THE EDITOR OF THE INDIA RUBBER WORLD:

DEAR SIR—I have read with much interest the report of your address at the chemical meeting. Your reference to the "pioneers" of the rubber industry is most pleasing. But are you not mistaken in naming Mr. Clapp as an inventor in the reclaiming process? He was one of the pioneers beyond question, but he acquired his knowledge of the business through J. B. Forsyth as I understand it. Mr. Forsyth one day gave me a detailed account of how he was the first one to reclaim rubber and how the health authorities of Boston compelled him to discontinue the work at Roxbury on account of the odor arising from it. Thereupon he persuaded and assisted Mr. Clapp to engage in the business at Hanover and was the sole user for a while, but later admitted the Boston Shoe Co. to a supply.

The Boston Shoe Co. had three years' start of its competitors in use of reclaimed and that was the basis of its subsequent prosperity.

It was very clear from Mr. Forsyth's statement that the process had its origin at Roxbury, and that Mr. Clapp was associated at Hanover, as a matter of friendship, to establish him in the business.

GEORGE WATKINSON.

[A pioneer in rubber himself, Mr. Watkinson brings up a very interesting point, and we are more than pleased to give the reason for our faith. We believe that Eugene H. Clapp was the real inventor of the "mechanical process" in reclaiming and this is why:

The real beginning of the reclaiming of vulcanized scrap was accomplished by Hiram Hall at the Beverly Rubber Works in 1858. The scrap was ground fine, boiled in hot water, (later it was devulcanized in hot steam), mixed with tar, spread on cloth and "solarized." Later J. B. Forsyth reclaimed vulcanized scrap, but did not remove the fiber. Eugene H. Clapp, who was a close friend of Forsyth, as Mr. Watkinson states, took over the grinding and devulcanizing of scrap for the Boston Belting Co., and did a small business. While doing this he invented the "air blast" process which removed all of the fiber and produced a far superior stock, that was at once in demand. the "air blast" he kept secret for several years and built up a big business because of it. In other words, he was the first to produce "mechanical" reclaimed rubber that could be used in general work, and for many years was the only source of supply for the trade.—THE EDITOR.]

THE RUBBER CHEMIST'S PROBLEMS.

TO THE EDITOR OF THE INDIA RUBBER WORLD:

DEAR SIR—In your recent address before the rubber chemists, published in the October issue, the introductory letter, which you describe as coming from an old-time rubber superintendent, appeals to me as being somewhat peculiar. Its contents may be judged from different points of view, and in replying it would hardly be fair to assume either that his attitude is wholly incorrect or yet quite correct.

The most difficult position among the many branches of industrial chemistry is doubtless that of the rubber chemist, the more so because of a seeming unwillingness in certain quarters to accord credit where credit is due.

In most modern industries it has been found necessary to analyze the raw materials, and, in very many cases also the product, as, for example, fertilizers, rubber goods, beers, etc. Many years of such analysis have developed standard methods, and today a chemist working in a fertilizer factory has his daily routine carried on automatically, yet his work is correct and valuable, but his position simple.

An entirely different proposition confronts the rubber chemist. Certainly most rubber chemists do routine work only, and many even think that is all there is to be done. Of course, to analyze crude rubber and other raw materials, such as mineral fillers, substitutes and specification goods, routine analysis is sufficient. But considering the intricacies of compounding, vulcanization, etc., this requires altogether more varied activity and knowledge than any routine work in other branches of industrial chemistry. But this is not all a real rubber chemist has to do. We must remember that many mechanical rubber goods are used in almost every industry, and some are subjected to various chemical processes. Any practical rubber man must admit that there come daily different complaints and questions, as, for example, can you make rubber rollers which will stand 73 per cent sulphuric acid, or rubber hose to withstand the action of acetic acid, or rubber washers to withstand chlorine gas, and hundreds of similar queries. Who should solve these problems? Would it not be hopeless to mix, without any chemical knowledge, dozens of compounds just to try them out, or should we give to the customer anything we may believe may do? We often hear that factories offer acid hose, one compound hose for all acids, like a single remedy for all sicknesses; and yet it is a fact that a compound which will withstand concentrated hydrochloric acid will not withstand 20 per cent acetic acid and vice versa. Since satisfactory service is the best fundament for business, every detail must be worked out. So here we have examples of the great difficulties rubber chemists have to meet, and while, to solve such problems, depends more upon individual capability than experience alone, it so happens that the chemist occasionally fails to solve such problems; and if the chemist fail, what chance has a practical rubber man without any chemical knowledge? But even though a manufacturer has had unfortunate experience with one chemist, this does not justify him to judge all the rest by the same measure.

I have cited here only a few examples of daily occurrence in rubber factories, but there is an unlimited field for research work on such problems as you described in your address. We live in progressive times and are forced to be progressive in order to meet competition; and, since the rubber industry is closely allied to chemical industry in general, a good chemist is absolutely necessary to keep the factory up to date. Although a poor chemist is just better than none, a good one will prove one of the best possible investments.

D. REPONY.

Passaic, New Jersey, October 13, 1916.

JUDICIAL DECISIONS.

MILLER RUBBER CO. AND OTHERS V. CITIZENS' TRUST & SAVINGS BANK. This case involved the subjects of bankruptcy; reclamation of property; consignment and sale; principal and agent; contract of agency and commissions.

By a contract, the claimant made bankrupt its exclusive agent for the sale of its goods within a certain territory, and agreed to keep him supplied with a stock which should remain claimant's property until sold to bona fide customers in the usual course of business. The contract did not fix, nor reserve the right to fix, prices at which the goods were to be sold, nor require bankrupt to account for the proceeds, but required him to report those on hand each month, and pay for goods sold, at a stated discount from list price, with provision for a credit of four months, if desired, up to a certain amount. Bankrupt was permitted to mingle the claimant's goods with his other stock, and the contract required claimant to furnish him

free of charge with advertising matter imprinted with his business name. The Court held, that while, as between the parties, the contract was one of consignment; as to creditors of the bankrupt, title to the goods passed to him, and they could not be reclaimed from his trustee.

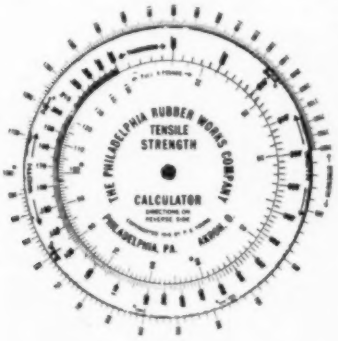
A contract under which goods were furnished to an agent for sale was construed, and it was held that the commissions were based on the sum named in the price list, less 5 per cent discount for cash. [The Federal Reporter, Vol. 233, page 489.]

DANIEL V. ELECTRIC HOSE & RUBBER CO. This was a suit relating to a patent for a corrugated hose, the corrugations of which appear to have been of structural value, in that they strengthened the hose against lateral strain and increased its wear. After the expiration of the patent, in 1889, the plaintiff continued for some years to be the only manufacturer of hose displaying these corrugations. Upon this sole ground, the plaintiff claimed that it thereby acquired an exclusive right to manufacture hose in that form, the form having become distinctive of its goods. The court said that, if this were the law, it would follow that the patentee, after the expiration of his patent, had he been the only maker of this hose for some years following, could, by his own act, turn his patent, which the law limited to seventeen years, into a perpetual one, and rejected the plaintiff's application as an unwarranted extension of the monopoly previously enjoyed under the patent. [The Federal Reporter, Vol. 231, page 827.]

DE LASKI & THROPP CIRCULAR WOVEN TIRE CO. AND OTHERS V. UNITED STATES TIRE CO. The De Laski v. Thropp patent, No. 1,011,450, for a tire wrapping machine was held void for prior use by others. [The Federal Reporter, Vol. 232, page 884.]

TENSILE STRENGTH CALCULATOR.

A CLEVER device to assist in calculating the tensile strength of rubber has been recently designed and copyrighted by Philip E. Young, New Bedford, Massachusetts. The "Tensile Calculator," as it is called, is really a modified form of the slide rule, and, as shown in the accompanying illustration, is extremely simple both in construction and operation. It comprises a circular disk of white celluloid, on which is superposed one of lesser diameter and transparent, serving as a support for the annular transparent disk that revolves around it.



The inner superposed disk, being transparent, shows graduations from 15 to 150, representing the pull of the testing machine in pounds. The annular revolving disk shows graduations from .035 to .350 that represent the thickness of the test piece in decimals of an inch. Coincident with the outer edge of the revolving disk and marked on the larger disk are graduations from 300 to 3,000, representing the tensile strength in pounds.

Knowing the thickness of the test piece and the pull of the testing machine in pounds, the reading for tensile strength is readily obtained by the following directions that are printed on the reverse of the calculator. These read: "Turn the transparent disk so that the thickness of the sample coincides with the pull obtained on the testing machine. On the outer scale, opposite the width of the sample, read the tensile strength."

The Philadelphia Rubber Works Co., Philadelphia, Pennsylvania, has ordered a supply of these calculators which they will send gratis to the rubber consuming trade upon receipt of a written request.

RUBBER TRADE INQUIRIES.

THE inquiries that follow have already been answered; nevertheless they are of interest, not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The editor is therefore glad to have those interested communicate with him.

[228.] A correspondent wishes to secure a second-hand tubing machine.

[229.] We are in receipt of two inquiries for rubber band cutting machines.

[230.] Names of manufacturers of dolls, balls and other toys made of rubber have been requested.

[231.] Names of vulcanizing accelerators and dealers in same have been requested.

[232.] A correspondent asks who manufactures a machine for making bundles of automobile casings, several tires to a bundle.

[233.] We have been asked where pure gum tape may be obtained and what concerns manufacture a machine to apply such tape on wire or similar substances.

[234.] Lists of manufacturers of electricians' gloves and of sponge rubber have been requested.

[235.] Manufacturers of laundry machinery such as washing machines, centrifugal driers, mangles, etc., are sought by a rubber manufacturer.

[236.] A rubber company wishes to know where flux may be obtained.

TRADE OPPORTUNITIES FROM CONSULAR REPORTS.

A firm in Cuba wishes to receive names and addresses of American manufacturers of machinery to be used in making automobile and bicycle tires and other rubber articles. Report No. 22,470.

A firm in Spain desires to import rubber packing. Report No. 22,471.

There is a market in Venezuela for all kinds of elastic products, such as suspenders, garters, belts, etc. Report No. 22,478.

A business man in Spain desires quotations on tennis balls. Report No. 22,523.

A New Zealand business man, now in the United States, wishes to be placed in touch with manufacturers of rubber, rubber dam and other dental supplies. Report No. 22,563.

An export house on the Pacific Coast has received orders from the Orient for elastic webbing. Report No. 22,642.

Representation of American manufacturers of machinery for rolling and working raw rubber, for laying prepared rubber around wires, and for stranding and braiding vulcanized rubber wires and cables is desired by a business man in Denmark. Report No. 22,663.

A commission agent in Holland desires to represent American manufacturers of rubber goods. Report No. 22,677.

A firm in Colombia is in the market for articles made of rubber. Report No. 22,681.

Inquiries have been received from Russia by an export house on the Pacific Coast, for rubber erasers. Report No. 22,721.

An inquirer in the Far East wishes to communicate with American manufacturers of elastic webbing. Report No. 22,730.

A firm in Greece wishes to import elastic for garters. Report No. 22,771.

The Bureau of Supplies and Accounts, Navy Department, Washington, D. C., seeks bids on 500 feet of suction rubber hose.

New Goods and Specialties.

THE "DOVER" RAINCOAT.

FOLLOWING upon several years' experimentation in perfecting a black surface proofing for raincoats, the model here illustrated is being placed on the market. The special feature of this waterproof fabric is its light weight—a 52-inch length coat not exceeding 2¼ pounds. The cut of this garment shows its close conformity to present feminine style tendencies.

To complete the outfit, a hood of the same material, called the "Peggy" is also being manufactured. It is loose lined with silk, and is particularly well adapted for motoring, yachting or evening wear.

The new proofing is applicable to silk, fine cambric, and to wool or cotton cantons. [Canadian Consolidated Rubber Co., Limited, Montreal, Canada.]

ELECTRIC LAMP CHANGER WITH RUBBER FINGERS.

A device which greatly simplifies the operation of renewing burnt out bulbs in high theatre and hotel canopies and other inaccessible stationary sockets consists of three sleeves carrying a set of metal tongues which are bent to the shape of a bulb and covered with rubber protectors for nearly their entire length. The two end sleeves slide within the middle one. The lower sleeve is fixed on the end of a bamboo or steel pole by means of a spread cotter-pin. The lower ends of the tongues are joined to a disk held in the upper sleeve and joined to the fixed bottom sleeve by means of a coil spring, which acts as a universal joint.

The operation is simple. The pole is lifted so that the rubber-covered tongues slip over the bulb. These are adjustable to various sizes of bulbs. The rubber serves as a cushion, and also as a friction, so that by twisting the pole, the lamp is unscrewed from its socket. The new bulb is placed by a reverse operation. [McGill Manufacturing Co., Valparaiso, Indiana.]

"E. Z." GARTER WITH WIDE ELASTIC.

With many styles of garters a man takes his choice of two disagreeable sensations, due to the manner of adjustment—wrinkled socks, or a tightness about the leg which interferes with the circulation and is frequently the cause of foot trouble. In the "E. Z." garter, an exceptionally wide elastic is used, which is in itself an advantage as it does not bind the leg as would a narrow band. Everlastik, Inc., Boston, Massachusetts, is the maker of this elastic, which is specially woven with a view of softness and pliability, and shapes itself to the leg without adjustments. It is of featherweight consistency and permits ventilation. The garter clasp is attached to the elastic by a double strip of soft, smooth leather and no metal part touches the wearer's leg. This clasp fits over an antifriction rubber-covered post or button, which holds the sock. It is claimed by the manufacturer that the regular size will fit 80 men out of 100, while a large size is furnished for men whose legs measure more than 14 inches at the calf. [The Thos. P. Taylor Co., Bridgeport, Conn.]

SHAMPOO APRON.

The shampoo apron here illustrated is an exceptionally well appearing utility garment for protecting the clothing while washing the hair. It is made of fine rubberized fabric, shaped to cover the back and shoulders and leaving the arms free. The edges are neatly bound, and the apron fastens at the sides and neck by means of narrow ribbons run through metal eyelets, forming a trim and serviceable article. [Ernest Dudley Chase, Boston, Massachusetts.]

"PITCH EM," A RUBBER HORSESHOE GAME.

Throwing horseshoes over a stake set up in the back yard was a favorite pastime of our forefathers. The iron horseshoes, however, were heavy and cumbersome, suited only to the hand of an adult. In "Pitch Em," rubber horseshoes with a steel stiffening core make possible the indulgence of this popular and ancient sport within doors, the necessary peg being embedded in a metal disk. The game affords opportunity for the cultivation of skill and accuracy appealing to adults, and, as the horseshoes are light in weight and incapable of injuring the furniture if thrown wildly, it is also suitable and amusing for children. [Walbert Manufacturing Co., Chicago, Illinois.]

RUBBER DISKS IN CHILDREN'S SHOES.

Many shoes for children are made with stiff soles; and, further, many of these soles are so polished and slippery that they deter children from learning to walk. While rubber disks in shoe soles are not new, their application to children's shoes, to prevent the wearers from slipping, is a new application. The shoe shown here has three disks of rubber-coated canvas set in the heels and five similar disks in the forepart of the sole, these being the principal wearing points in walking. They wear down even with the level of the soles, but prevent slipping. [Little Chick Shoe Co., Chicago, Illinois.]

"RESISTOIL" AIR HOSE.

Ordinary hose, as used in garages, gets hard usage and little care. Because of this, and often from inherent weakness, it gives but comparatively short service. After years of unpleasant experience an air hose manufacturer claims to have discovered that the primary source of trouble lay in the inner tube. The oil that necessarily works its way into the hose eats through the inner tube. The air follows the perforation, working up and down the length of hose and leaking through the plies of cloth and rubber until it finds an outlet through the outside covering. Garage men then wind tape around the leaky place, while the air runs along under this patch until it finds another weak spot where it bursts out again.

Acting upon this knowledge, an oil-proof inner tube, the "Resistoil," shown in the accompanying illustration, was evolved. [Brunner Manufacturing Co., Utica., New York.]

AVON SPORTING-BOOT STUDS.

For golfers, hockey players, and many outdoor workers, a shoe that firmly grips the turf is a prime necessity. The hob-nails frequently used for this purpose being heavy and cumbersome, are liable to blister the feet in summer and to make holes which cause wet, cold feet in winter. In the accompanying illustration a new design in rubber studs is shown, these studs being placed at regular intervals around the edge of the sole and heel. The manufacturer claims that by their use coolness in summer is obtained; also, dry warmth in winter, a thorough grip under all conditions, and exceptional wearing quality. Sets of large studs for men's, and small studs for women's boots are supplied in neat boxes, with nails for attaching them to the shoes. [The Avon India Rubber Co., Limited, Melksham, England.]

FLOOR SCRAPER WITH RUBBER TIRES.

Here is a floor scraper whose 5-inch wheels are equipped with rubber tires, thus avoiding all injury to the floor while in use. This No. 10 model is intended for scraping large surfaces. The adjustable cross handle may be placed to one side or the other, thus allowing the 6-inch double edge knife to be worked up to the wall and into the corners. The knife is firmly clamped in the scraper and nearly all the weight of the machine rests on the knife, preventing the vibration or "chatter" which causes wavy lines on the floor. The scraper is finished in aluminum; the length of handle and braces is 38½ inches, and the shipping weight, 135 pounds. [E. C. Stearns & Co., Syracuse, New York.]

TOY WITH RUBBER CORDS.

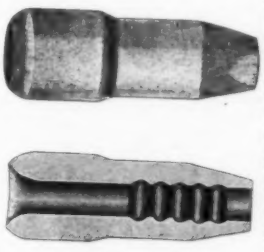
Toys whose pleasing absurdity, gay coloring and elastic power of motion would commend them to any child, are the duck-like figures of wood, colored in red, yellow, white and blue, in feminine or masculine guise, called the "Quacky Doodles" "Dandy Daddles" family. Their animated movements, which afford never-ending amusement for the little ones, are effected by the long jointed neck and strong rubber cord used in holding the head and neck together. The jointed neck is patented and operates on the ball and socket principle. The legs are also held to the body by elastic cords, permitting free movement. These toys were designed by Johnny Gruelle, a well-known artist. Their subtly humorous quality is appreciated by adults as well as children, and they are largely used as place cards. [P. F. Volland & Co., Chicago, Illinois.]

ANTI-JAR SOCKETS FOR UMBRELLAS.

On the theory that every silencer and shock absorber is a benefit, the no-jar principle is now applied to umbrellas. A socket of sheet metal is made to fit over the tip of the umbrella. This is covered with a piece of rubber tubing, and at the end by a disk of rubber. When this protector is slipped over the tip or point of the umbrella it acts as does an elastic tip on a cane, absorbing the shock, preventing the slip, and quieting the noise. [Patterson Brothers, New York City.]

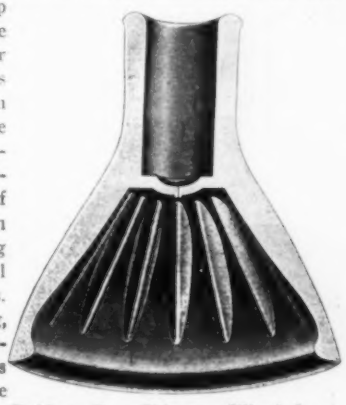
GAS TIGHT END FOR TUBING.

The use of rubber tubing for conveying gas from the household burner tip, or from special nozzles adapted for the purpose, is, to a greater or less extent, subject to leakage from imperfect connection. A rubber gas end is now manufactured which has an inside thread, or a series of annular ridges, which are sufficiently elastic to slip over the jet or nozzle, and to insure a gas-tight connection. The illustration shows the appearance of this useful accessory, while the sectional view gives details of its construction. [Durst Manufacturing Co., Inc., New York City.]



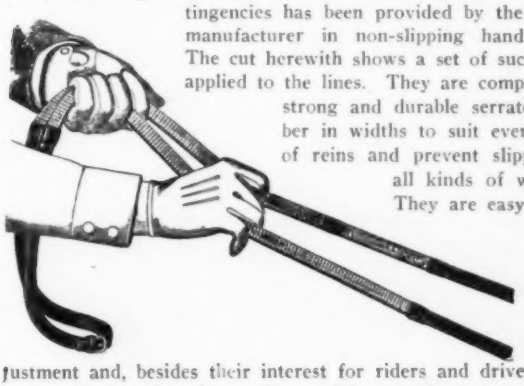
RIBBED FORCE CUP.

The rubber force cup here shown is designed to secure with less material a cup as strong and efficient in all respects as the standard force cup. By means of longitudinal ribs in the side walls, the weight of the cup is lightened, while at the same time its suction power is increased, and it is claimed that the saving in weight is added to the quality of material. An increase in weight of the lower or working portion of the cup and a decrease in the upper portion holding the wood handle, adds still further to its effectiveness. The result is a light, strong, quick-acting cup, whose improved quality and utility is generally recognized by the plumbing trade. [Dryden Rubber Co., Chicago, Illinois.]



NON-SLIDE HAND HOLDS.

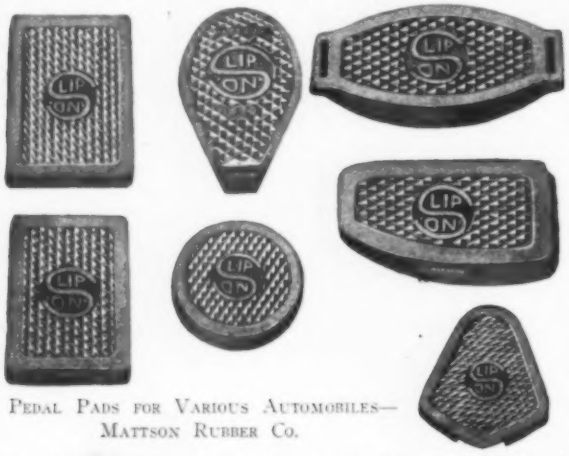
Many distressing accidents have been caused by the slipping of reins through the hands. But insurance against such contingencies has been provided by the rubber manufacturer in non-slipping hand holds. The cut herewith shows a set of such holds applied to the lines. They are composed of strong and durable serrated rubber in widths to suit every class of reins and prevent slipping in all kinds of weather. They are easy of adjustment and, besides their interest for riders and drivers generally, the fact that they make possible a perfect grip with one hand gives them a special value to those devoted to polo, steeple chasing and hunting. [C. W. Moseman & Bro., Walsall, England.]



AUTOMOBILE PEDAL PADS.

THE metallic control pedals of automobiles, however deeply grooved, corrugated or otherwise roughened, very rapidly wear smooth and slippery, because the necessity of providing a pedal that will not cause too great fatigue to the foot prevents the use of extra hard steel in these attachments.

These control pedals should always be ready for instant action. The slipping of the driver's foot from a pedal would mean momentary loss of control which might result in a serious accident, and automobilists long ago recognized the desirability of equipping their control pedals with some slip-proof device. Wood was tried and found of little value; some use insulating tape. But live, resilient, vulcanized rubber remains the only ideal, positive safeguard against foot slipping on automobile control pedals, and many different designs of rubber pedal pads have been placed upon the market.



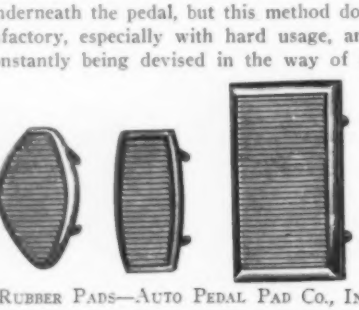
PEDAL PADS FOR VARIOUS AUTOMOBILES—MATTSON RUBBER CO.

PEDAL PAD—MECHANICAL RUBBER CO.

NEVER-SLIP ADJUSTABLE AUTO PEDAL—GEO. H. RIVES CO.

The element of safety which these rubber pedal pads insure is not their only advantage. They relieve the muscle tension caused by constant pressure of the driver's feet, especially harmful in heavy city traffic; they save shoe leather from excessive wear; and they also act as insulators, protecting the driver's feet from the heat that constantly radiates from the motor to the control pedals and other metallic parts of the car.

The rubber pad, of course, must be detachable, in order that it may be really renewed. In some models, an adhesive lip attaches the pad underneath the pedal, but this method does not always prove satisfactory, especially with hard usage, and improvements are constantly being devised in the way of special clamps and steel frames which join the rubber pad to the metal pedal so firmly that it cannot slip off nor shift in the slightest degree. A group of the various types of pedal pads manufactured by the Mattson Rubber Co., Lodi, New Jersey, for different makes of cars, is shown herewith; also, the pedal pad of the Mechanical Rubber Co., Cleveland, Ohio, which has an indented rubber surface and metal strips for attachment to the pedal; the adjustable "Never-slip Auto-Pedal" designed for all makes of cars by the George H. Rives Manufacturing Co., New York City; four models of the steel-framed, corrugated rubber pedal pads of the Auto Pedal Pad Co., Inc., New York City; and two views of the pedal mat of the Emil Grossman Manufacturing Co., Inc., Brooklyn, New York, showing the rubber grip surface and a view of the back, showing the method of fastening.



STEEL FRAMED RUBBER PADS—AUTO PEDAL PAD CO., INC.

PEDAL MAT—EMIL GROSSMAN MFG. CO.

BACK VIEW OF GROSSMAN PEDAL.

CORRUGATED FINGER PAD.

Fingertips of rubber are used by cashiers, bank tellers and others who are obliged to handle paper money, and by those who are required to count sheets of paper, or for similar manipulation. A tip or pad with perforations to allow ventilation, and which also has ribs or corrugations forming a non-slip feature which facilitates lifting one and only one sheet or bill at a time, is called the "Marsh" hygienic finger pad, which is claimed to be the only patented device of its kind [Davol Rubber Co., Providence, Rhode Island.]

ADVANCE IN TENNIS SHOES.

As was reported in THE INDIA RUBBER WORLD last month, the United States Rubber Co. sent out a new price list of tennis footwear lines on September 1. This price list, as usual, was "subject to change without notice." This was certainly not a meaningless phrase, for the last of September the customers of the company were notified of an advance, amounting to from 3 to 5 cents per pair on Vim Bals and Oxfords. The changes were as follows:

	Bals.		Oxfords.	
	Sept. 1	Sept. 26	Sept. 1	Sept. 26
Men's Vim	53 cents	57 cents	43 cents	47 cents
Boys' Vim	50 "	55 "	40 "	45 "
Youths' Vim	49 "	53 "	39 "	39 "
Women's Vim	50 "	54 "	40 "	40 "
Misses' Vim	48 "	52 "	38 "	42 "
Children's Vim	45 "	48 "	35 "	38 "

Prices are the same in individual cartons or in bulk; 24 pairs to the case.

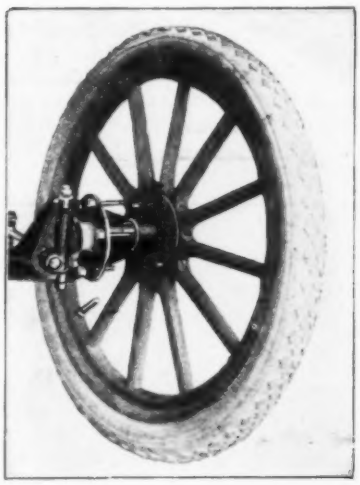
No changes were indicated in the other tennis lines, or "Keds," as they are now designated.

The Year Book of the National Fire Protection Association is at hand. It gives the articles of association, the officers and committees, and a full list of associate members. The latter list contains about 3,000 names, of which perhaps 10 per cent are Canadian firms and individuals. Among these, the rubber trade is fairly well represented. In addition to this are a number of members in various countries of Europe, Australasia, Africa and Eastern Asia.

The exhibit of the Mishawaka Woolen Manufacturing Co., Mishawaka, Indiana, at the recent Inter-State Fair held at Springbrook Park in South Bend, Indiana, was unanimously voted the best at the fair, as the company had a man at work all the time making boots.

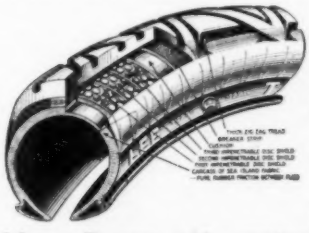
STANDARD DEMOUNTABLE WHEEL SET FOR FORD CARS.

By means of a set of demountable wheel attachments and a spare wheel, the troublesome operation of changing tires when on the road is greatly simplified. A spare wheel is furnished to carry a tire already inflated, and in case of a blow-out or puncture, all that needs to be done is to unscrew the four nuts shown in the illustration, change wheels and replace the nuts. The regular wheels already on the car may be used, the special parts furnished with this demountable wheel set rendering them all interchangeably demountable, one with the other. These special parts include four inner flanges, eight flange-retaining bolts and nuts and 16 special hub bolts and nuts. One inner flange and two bolts are used to equip each wheel, while four special hub bolts and nuts should be mounted on each hub. The nuts are of fine hardened steel, rust proof and insensible to damage through severe use. The special bolts are manufactured from high carbon steel of great tensile and torsional strength and are claimed to have a capacity 300 per cent greater than that of ordinary carriage bolts. [The Standard Auto Accessory Co., Leipsic, Ohio.]



THE LEE PUNCTURE-PROOF GUARANTEED TIRE.

The users of Lee tires are provided with double assurance while motoring, one being a puncture-proof guarantee and the other a guarantee for 5,000 miles. The evils of puncture include roadside delays, discomfort and expense, all of which are usually collated in two fearsome words, "tire troubles."



Ordinary pneumatic tires are at the mercy of nails, glass and sharp stones that persistently find their way in the path of all motorists one day or the other. Chance only decides how soon the best car and the most careful driver will meet with puncture disaster.

In the Lee tires, three separate layers of small puncture-proof disks are embedded in the rubber of the cushion that lies between the carcass and the breaker strip, forming a flexible armor of mail. It will be seen by referring to the illustration that while these disks overlap they do not touch each other, thereby avoiding the danger of friction and consequent heating. The carcass and tube are thereby protected and it is claimed that resiliency and wearing quality are increased by a special rubber compound and curing process. [Lee Tire & Rubber Co., Conshohocken, Pennsylvania.]

S. A. E. TIRE DIVISION RECOMMENDATIONS.

At the meeting of the Society of Automobile Engineers, held October 18 at the Bureau of Standards, Washington, D. C., the tire division recommended straight side tires from 32 by 3½ to 36 by 4½, as the larger straight sides are not practical. This recommendation was amended with a provision that straight sides be of the wide standard. The report was adopted.

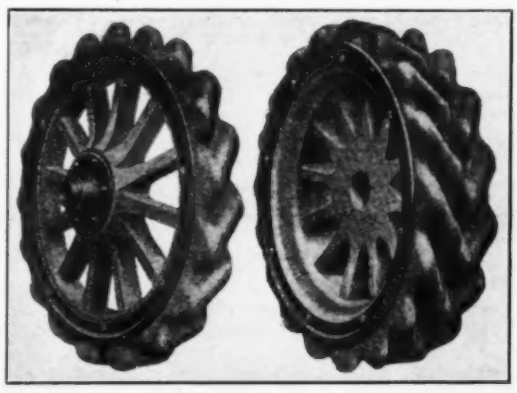
THE BURRILL TIRE TOOL.

Split demountable rims require something more than ordinary tools to satisfactorily remove them from the tire. The utility of such a device consists, first of all, in compactness and simplicity of construction, then facility in applying it to the rim and an easy method of exerting in an even manner the force necessary to remove the rim.

As shown in the illustration, the two grips are hinged to the right and left-hand screw bolts that form part of what is known as an ordinary turnbuckle. The grips are slipped over the rim and with a few turns of the handle that is attached to the turnbuckle, the rim is sprung away from the tire without distortion, and easily removed. In applying the rim to a tire, the tool is attached in the manner previously described and the rim bent slightly downward, when it can then be sprung in place. [The Burrill Tire Tool Co., Concord Junction, Massachusetts.]

MOTOR FIRE ENGINE TIRES.

Tires for motor fire engines present some problems other than those common to motor truck or automobile tires. These engines have the weight and bulk of motor trucks, but require to be driven at the speed of the motor car. The main problem is to prevent skidding, and two special tires which are pronounced peculiarly efficacious for this purpose are shown in the illustration. One of these shows parallel ribs diagonal to the rim. The other shows two sets of such ribs, at opposite angles, the tread being twice as broad. [The Shrewsbury & Calliner Tire Co., Limited, Ardwick Green, Manchester, England.]



CROSS RIB TIRES FOR MOTOR ENGINES.

THE UNITED STATES CIVIL SERVICE COMMISSION, WASHINGTON, D. C., announces an open competitive examination for expert electrical and mechanical aid to fill a vacancy in the Bureau of Yards and Docks, Navy Department, and vacancies which may occur in positions requiring similar qualifications. Applications must be filed with the Commission at the above address before November 14.

Rubber-Soled Footwear for Indoor Sports.

NOW is the season when devotees of athletics transfer most of their activities to the gymnasium, and, therefore, shoes adapted specially for such use are in demand. The manufacturers have not been backward in furnishing suitable footwear for this purpose, giving special attention to the requirements of the various uses to which it is to be put in the various games.

Just at present there is a greater demand for basket-ball shoes than any other line of this kind, though it is safe to assume that many shoes made expressly for this game are used in bowling, fencing, and other athletic sports. The principal requirements of basket-ball shoes are that they shall be strong and able to withstand the hard service to which they are subjected without ripping or tearing.

Another, and perhaps the principal requirement, however, is that they should have a non-slipping quality, that they should cling to the floor, which is usually highly polished, and on which ordinary footwear would render its use dangerous to the point of impossibility.

As a rule, manufacturers use the vacuum principle in the soles provided for this purpose, and several patterns are shown as used by different manufacturers. As is shown below, the Beacon Falls Rubber Shoe Co., Beacon Falls, Connecticut, gets out a special basket-ball shoe, leather-trimmed, with a suction cup sole of red rubber. As will be readily noted, this sole has a wide edge, inside of which is a collection of square, convex sections, each having a vacuum cup in its center.

Another form of elaborate sole is shown by the Converse Rubber Shoe Co., Malden, Massachusetts, which contains, inside of the broad edge, a depressed section composed of square spaces divided from each other by diagonal ridges and, in addition to these, the sections at the inside edge of the tread, both sole and heel, have further walls or longitudinal divisions.

Of the designs of the uppers of these shoes, the illustrations are sufficiently clear to require but little description. It will be noticed that they vary as regards the design at the toe, some showing leather caps, while others simply increase the width of the foxing, as shown in the shoe made by the La Crosse Rubber Mills Co., La Crosse, Wisconsin. Some of these shoes also have leather patches as extra protection to the ankle bones.

Attention might be called to the peculiarity of the sole of the shoe manufactured by the United States Rubber Co., New York City, the tread of the sole being beveled outward, the edge being cut at an angle, this of itself giving a clinging quality appreciated by basket-ball players.

These, of course, are only a few of the many lines manufactured for this or similar purposes, but it will serve to give readers an idea of the leading features of this special kind of footwear.

BASKET BALL "KED"
UNITED STATES RUBBER CO.

BASKET BALL SHOE
LA CROSSE RUBBER MILLS CO.

"KING PIN" BASKET BALL SHOE
CONVERSE RUBBER SHOE CO.

"CENTURY" BASKET BALL SHOE
APSLEY RUBBER CO.

BASKET BALL SHOE
APSLEY RUBBER CO.

"GRIP SURE" BASKET BALL SHOE
BEACON FALLS RUBBER SHOE CO.

The Obituary Record.

AN AUTHORITY ON PLANTATION RUBBER.

CHARLES Arthur Lampard, whose death is chronicled in the English press, was one of the best known men in the rubber plantation industry of the Far East. Starting in business with a tea importing house in London, he later connected himself with the important firm of Harrisons & Crosfield, Limited, devoting his attention to their foreign business. He made frequent visits to the various countries of Europe and to America, and in 1895 went to the Far East, establishing houses in Ceylon, India, the Federated Malay States, Sumatra and Java.

C. A. LAMPARD.

Early appreciating the importance of the plantation industry, he devoted his attention mainly to this branch. He became chairman of the Rubber Plantations Investment Trust, Limited, and at the time of his death was a director in no less than 29 of the most successful rubber companies. It is stated that the association of his name with any new venture connected with the rubber plantation industry was a guarantee of soundness and that his unflinching optimism was a valuable asset to the industry during that period of doubt and difficulty which followed the collapse of the first wild boom. In his position as chairman of the Rubber Plantations Investment Trust, Limited, his addresses at the opening of the annual meetings were quoted far and wide, and many of his estimates and predictions as to the future of plantation rubber were subsequently verified with remarkable accuracy.

Mr. Lampard was not a believer in the practicability of the commercial production of synthetic rubber. He was one of the first to urge the advisability of forward rubber contracts and he foresaw the present situation of American consumers buying rubber in the East and shipping direct, thus eliminating the added expense of doing business through London.

Although still comparatively young, since the loss of a son in the present war Mr. Lampard's health had steadily declined, and in the early part of this year he relinquished his directorship of Harrisons & Crosfield and gradually curtailed his activities in other directions and practically retired to his estate in Home Park, Rotherfield, Sussex, where his death occurred as above stated. Mr. Lampard was one of the keenest and most far-sighted men of the rubber planting world in London, and by his death the trade loses one of its leaders and most striking personalities.

HANDLED TIRE FABRICS.

W. H. Tobey, Chicago manager, and director of J. H. Lane & Co., well known in the rubber trade, died in that city on October 3, after a long period of illness. He was about 44 years of age, and had been connected with J. H. Lane & Co. for the last 23 years. He was held in high esteem by his business associates and by all with whom he came in contact.

WELL-KNOWN WASTE MATERIAL MAN.

M. Kaufman, head of the waste material house of that name in Chicago, Illinois, died in that city late in September, aged 77 years. Mr. Kaufman had been in the waste material business in Chicago since 1866, but during the past 10 years had not been active in the management of the business. He was highly esteemed by many in his own and other lines of business.

INVENTOR OF LIQUID INSULATION.

Henry Splitdorf, whose name is associated with Morse, Clark and Edison as inventor of important electrical devices, died in New York City on October 16, in the eighty-third year of his age. Mr. Splitdorf was born in Germany, came to this country at the age of 14 years, and was apprenticed to the machinist's trade. Later he entered the electrical business. Although he had but a common school education, by assiduous and concentrated study of electrical matters he became an expert and many of his inventions were of great importance in the fields of electricity and telegraphy. Of especial interest is the fact that he was associated with Samuel F. B. Morse in the development of telegraphic apparatus and in connection with Clark he developed the Clark repeater, which made it possible for Thomas A. Edison to invent the multiple system of telegraphy, and at the time of his death Mr. Splitdorf had been working upon a storage battery which, however, had not been perfected. It was he who introduced asbestos as an insulating material and he was the inventor of liquid insulation of magnetic wire which has practically replaced the more expensive silk insulation used previously. It is through this invention very largely that present perfection in insulated wire has been attained.

HENRY SPLITDORF.

Mr. Splitdorf was a constant attendant at St. Peter's Episcopal Church at Westchester, New York. Until old age overtook him he was a member of the Arion Club and the Liederkranz. He leaves two married daughters and two sons, one of whom, Charles Splitdorf, is vice-president of the Splitdorf Electrical Co., of Newark, New Jersey.

A POPULAR PURCHASING AGENT.

Nelson W. Sayles, purchasing agent of the Republic Rubber Co., Youngstown, Ohio, died in New York City October 14. He had been in declining health for a number of months. While

on a vacation he became critically ill, and six weeks later succumbed. Mr. Sayles was a graduate of Yale University. He entered the accounting department of the Republic Rubber Co. in 1910, and a year later was made purchasing agent. In business and in social circles he was universally esteemed, and by his kindness and genial spirit won many friends who deeply deplore his death.

A VETERAN IN RUBBER TIRE INDUSTRY.

George D. Edwards, manager of the Detroit (Michigan) branch of the Kelly-Springfield Tire Co., Akron, Ohio, died in Detroit, October 4. Mr. Edwards had been in the tire business over 20 years, dating back to his connection with the Rubber Tire & Wheel Co., the predecessor of the Kelly-Springfield company.

EXPERT IN TIRE MANUFACTURE.

Grover I. Myers, head of the pneumatic tire department of the Firestone Tire & Rubber Co., Akron, O., died as the result of an automobile accident last August.

CANADIAN CONSOLIDATED EMPLOYES.

The executives of the Canadian Consolidated Rubber Co., Limited, Montreal, Canada, have instituted an employes' thrift plan to encourage money-saving among the employes of the company. This plan gives any employe the privilege of placing with the company any portion of his or her wages or salary which can be readily spared, for which the company will allow interest, to be added monthly. When the amount reaches $100 or more it may, upon request, be used for investing in government bonds or other securities, the company giving every assistance in making this investment. It is thought that this will be of real practical benefit to the employes and that those who avail themselves of this privilege will be better employes for the company and thus render the benefit mutual. It will be interesting to see how many employes will avail themselves of this practical opportunity.

RUBBER SALESMAN IMPRISONED IN FRANCE.

News has been received from Paris, France, that William C. Silbermann, of New York City, was sentenced by the Correctional Court to five years in prison and a fine of 500 francs, under a charge of trading with the enemy. It is claimed that Mr. Silbermann came to Paris with papers describing him as a representative of the King Rubber Co., of Hyde Park, Boston, Massachusetts, and on the strength of these papers he obtained several important orders, but was finally denounced by a Serbian who had known him in New York, and who said that he was acting for Gottwik, Scheffer & Co., dealers in druggists' sundries in New York City. The senior member of the latter firm states that Mr. Silbermann was never in its employ, and it was learned from Maurice D. Kingsbury, manager of the King Rubber Co., that Gottwik, Scheffer & Co. are the selling agents in New York City for the King Rubber Co., and that this firm recommended Silbermann as a good man to represent the rubber company abroad and to handle sales of rubber gloves, etc., made by the King company, to the English and French military forces. Mr. Kingsbury is also reported to have said that, although Mr. Silbermann went abroad some time last March he had made no report of sales nor had he drawn any money on account of the King Rubber Co. The case has been placed in the hands of the State Department at Washington.

The State of Missouri probably produces more barytes than any other in the Union. During 1915, barytes producers in this state marketed 40,000 tons. This substance is extensively used in rubber compounding.

ANNUAL REPORT OF THE INTERCONTINENTAL RUBBER CO.

AT THE annual meeting of the Intercontinental Rubber Co., Jersey City, New Jersey, held October 2, Secretary Willard P. Smith, in his annual report covering the year ending July 31, 1916, states that;

Conditions in Mexico have not improved the past year, and have been such that it has not been possible to operate the factory at all since the month of August, 1915. The prevailing prices for rubber have been low, but a reasonable profit has been realized from the sale of the stock remaining on hand at the time of shutdown.

Conditions on the Cedros Ranch likewise continued to be such that it has not been possible to round up the stock, nor to make any physical inventories. Gathering of guayule shrub, from which the rubber is extracted, has also been entirely stopped.

It has been possible to hold a meeting of the Directors of the Compania Ganadera y Textil de Cedros, S. A., which owns the ranch, and a small dividend from the prior earnings of that company was transferred to the income of the Intercontinental Rubber Company. The losses at the ranch from revolutionary disturbances, however, have seriously reduced the profits derived from former operations.

The balance sheet, which is reprinted below, shows net profits and income from investments amounting to nearly $540,000, as compared with $240,000 for the preceding year, and the surplus last July was nearly $523,000 larger than the same time the year before.

BALANCE SHEET—JULY 31, 1916.

ASSETS.

Investments in stock:		
Merged and subsidiary Companies:		
By Cash	$ 2,115,321.59	
By Stock issues	28,198,575.30	
Other Companies	387,970.00	$30,701,866.89
Patents (exclusive of subsidiary Companies)		15,141.77
Accounts and Notes Receivable, etc.:		
Advances to subsidiary Companies	$ 306,020.40	
Sundry accounts	48,807.55	354,827.95
Investment Securities (market value)		1,231,355.00
Cash		435,273.84
		$32,738,465.45

LIABILITIES.

Capital Stock: Common		$29,031,000.00
Accounts Payable, Taxes accrued, etc.:		
Due to subsidiary Companies	$ 14,140.04	
Sundry accounts	8,469.70	22,609.74
Reserve accounts		734,433.71
Surplus (as below)		2,950,422.00
		$32,738,465.45

SURPLUS ACCOUNT.

Surplus August 1, 1915		$ 2,427,077.39
Gross Profits on operations	$ 42,995.95	
Net Profits and Income from Investments, Interest, etc (after adjustment of investment securities to current market value	538,906.83	
	$ 581,902.78	
Less Administration, Taxes, and General Expenses	45,914.32	535,988.46
		$ 2,963,065.85
Charges against Surplus:		
Reserve against loans to subsidiary Companies		12,643.85
Surplus, July 31, 1916		$ 2,950,422.00

At the annual meeting of the board of directors, the following officers were elected: G. H. Carnahan, chairman and president; E. B. Aldrich, vice-president; W. P. Smith, secretary and treasurer.

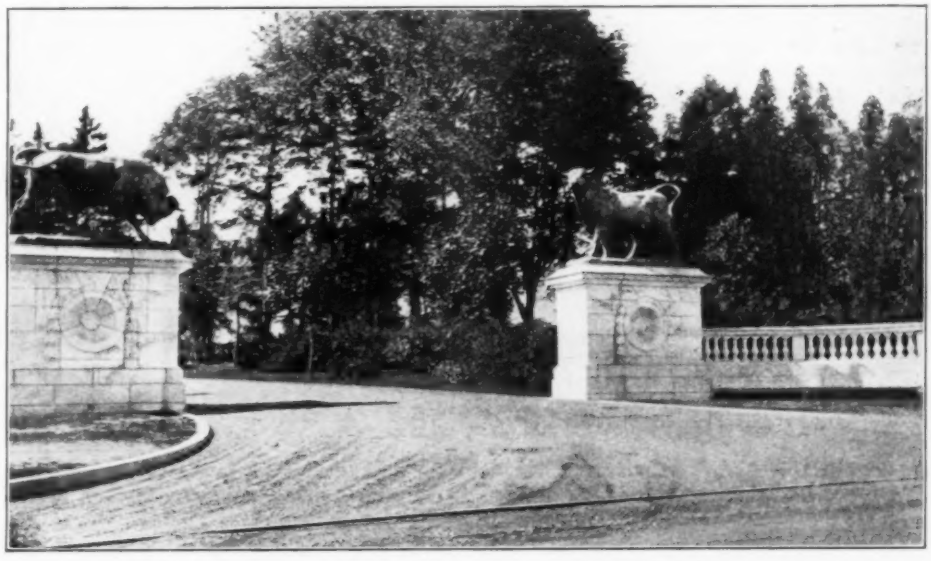
CONSOLIDATION RUMOR DENIED.

It having been rumored that The B. F. Goodrich Co., Akron, Ohio, had completed plans to take over the Boston Belting Co., President T. A. Forsyth of the latter company states that there is absolutely no foundation for such report; that the Boston Belting Co. has not been sold to any interests, and that there are no negotiations with any party having that end in view.

Rubber Men and Bankers Guests of Colonel Colt.

NEARLY 150 men prominent in financial circles were the guests of Colonel Samuel P. Colt, president of the United States Rubber Co., at his stock farm at Bristol, Rhode Island, on September 30. The invitations read: "To meet the president and directors of the Industrial Trust Co., of Providence, Rhode Island." The program, which was to some extent informal, included a lunch served in a large tent on the lawn opposite the casino, and inspection of the farm, during which there was an exhibition of the milking by an electrically operated device, of fine blooded cattle of pedigreed stock.

At 2 o'clock dinner was served in the casino, both the interior of the building and the spacious veranda being occupied. The interior was tastefully decorated with autumn foliage and with flowers from Colonel Colt's conservatories. A real Rhode Island clam-bake dinner was served which was fully appreciated by all the guests.



MAIN ENTRANCE TO COLT FARM. MAGNIFICENT "PRIVATE PROPERTY," WHERE THE PUBLIC IS WELCOME

Colonel Colt, in opening the more formal exercises, proposed toasts to the President of the United States. R. Livingston Beeckman, Governor of Rhode Island, and others. The principal speakers were Governor Beeckman, Colonel H. Martin Brown, president of the Industrial Trust Co., of Providence; Francis L. Hine, president of the First National Bank of New York City; Senator Le Baron B. Colt, William Cameron Forbes, former governor of the Philippine Islands; Colonel Samuel M. Nicholson, vice-president of the Industrial Trust Co., and Howard Elliott, president of the New York, New Haven and Hartford Railroad.

Naturally, most of the addresses treated of the present industrial prosperity of the country and the financial situation, which was well summed up by Senator Colt, who advised bankers to direct their energies to the power of production and the extension of our commerce, both foreign and domestic.

Besides the presidents and directors of many of the leading financial institutions of the country there were a number of guests who are prominent in the rubber trade. Among them were T. H. Rieder, vice-president and general manager, of the Canadian Consolidated Rubber Co., Limited, Montreal, Canada; Roswell C. Colt, assistant secretary, and Victor E. Mitchell, of the same company; E. J. Hathorne, treasurer, Rubber Goods Manufacturing Co., New York City; E. H. Broadwell, vice-president, Fisk Rubber Co., Chicopee Falls, Massachusetts; Andrew W. Anthony, of the National India Rubber Co., Bristol, Rhode Island, and the following officers of the United States Rubber Co.: J. Newton Gunn, vice-president; W. G. Parsons, treasurer; Samuel Norris, secretary; John D. Carberry, assistant secretary; William E. Barker, manager of sales; Walter S. Ballou, Wilson H. Blackwell, Frank W. Roche and others.

An orchestra furnished music during the repast, and the formal exercises were appropriately closed with a rendition of "The End of a Perfect Day."

PRESIDENT BOWERS TO RETIRE.

William F. Bowers, founder and president of the Bowers Rubber Co., San Francisco, California, a pioneer rubber manufacturing concern on the Pacific Slope, having sold his interests, will retire from business. Mr. Bowers has had a most interesting record. He went to California from Lynn, Massachusetts, as a representative of the Gutta Percha & Rubber Manufacturing Co. in the late seventies. In 1882 he formed the Bowers Rubber Co., which was incorporated with a capital of $300,000, to take over the San Francisco plant of the Gutta Percha & Rubber Manufacturing Co. and engage in making goods on an independent basis. This was the first company to manufacture rubber goods west of the Rockies on a large scale, and later was the pioneer manufacturer of fabric fire hose on the Coast. The company prospered from the start, and later acquired a plant of about 12 acres in the city of San Francisco. The works built there withstood the shock of the earthquake in 1906, only to be totally destroyed by the fire which followed. A new and more extensive plant was built at Black Diamond, California, and was steadily enlarged as the business grew. For many years this company furnished all the fire hose used in the City of San Francisco, did business all along the Coast and filled several contracts for dredge sleeves and suction hose for the Panama Canal Commission. The company now manufactures a full line of mechanicals and has recently taken on the production of tires and tire tubes.

Mr. Bowers has taken out many patents for hose, hose reels, packing, etc.

He was very highly regarded by all connected with him in business and popular with his employes. So prominent a figure in the Pacific Coast rubber trade will not drop out of it without much regret on the part of all with whom he came in contact.

News of the American Rubber Trade.

SOMERSET RUBBER RECLAIMING WORKS IMPROVEMENTS.

THE Somerset Rubber Reclaiming Works, of New Brunswick, New Jersey, have been making many changes in their factory at East Millstone, adding a number of labor saving devices and machinery to cut down the cost of manufacture, and doubling the producing capacity. A sprinkler system has been installed, the company having joined the Factory Mutual Fire Insurance Cos. For the comfort and convenience of the workmen, shower baths have been installed. The laboratory has been enlarged and equipped with the latest modern apparatus, and a staff of chemists is employed to keep check on the material as it passes through the factory, to assure uniformity of the product. This laboratory is placed at the disposal of the company's customers, expert service being furnished; all such matters of course being treated absolutely confidentially. A specialty of the company is white reclaimed rubber, for which a very large demand is noted. The plant has been working day and night to full capacity.

REINCORPORATES WITH ENLARGED CAPITAL.

The Pennsylvania Rubber Co., Inc., notice of whose incorporation appeared in the September issue of THE INDIA RUBBER WORLD, has been organized with an authorized capital of $6,000,000, of which $1,000,000 is 7 per cent cumulative preferred stock and $5,000,000 is common stock, for the purpose of providing the additional financial requirements necessary to properly handle and care for the increased volume of business of the Pennsylvania Rubber Co. It is asserted that from a volume of trade of less than $1,000,000 in 1909, the business of the company has developed so that this year it will pass the $5,000,000 mark. The directors of the new incorporation are as follows: Herbert DuPuy, H. Wilfred DuPuy, C. M. DuPuy, Seneca G. Lewis, George W. Shiveley and George A. McLaughlin.

CAPITAL INCREASE OF FISK RUBBER CO.

At a special meeting of the stockholders of The Fisk Rubber Co., Chicopee Falls, Massachusetts, October 2, mentioned last month, it was voted to authorize an increase in the capital stock of the corporation by $24,500,000, divided as follows: $7,500,000 first preferred convertible stock, of which $5,000,000 will be issued at once; $5,000,000 second preferred, of which $2,500,000 will be issued, and $12,000,000 common stock which will remain in the treasury. The additional issue of second preferred is being taken by the junior security holders, being offered to them on a basis of one share for every four shares of common and second preferred owned in the aggregate. The first preferred has been underwritten by a syndicate headed by Estabrook & Co., Boston, Massachusetts. The new cash is to be used for working capital.

RUBBER COMPANY SHARE QUOTATIONS.

The following market quotations of shares of rubber manufacturing companies on October 25, are furnished by John Burnham & Co., 115 Broadway, New York City, and 41 South La Salle street, Chicago, Illinois:

	Bid.	Asked.
Ajax Rubber Co. (new)	63	65
Firestone Tire & Rubber Co., common	1135	1150
Firestone Tire & Rubber Co., preferred	110	112
The B. F. Goodrich Co., common	73¾	74
The B. F. Goodrich Co., preferred	113	114⅛
Goodyear Tire & Rubber Co., common	295½	298
Goodyear Tire & Rubber Co., preferred	108½	109
Kelly-Springfield Tire Co., common	77½	78
Kelly-Springfield Tire Co., 1st preferred	98	100
Miller Rubber Co., common	250	260
Miller Rubber Co., preferred	105	107
Portage Rubber Co., common	174	176
Portage Rubber Co., preferred	173	174
United States Rubber Co., common	60	60⅛
Swinehart Tire & Rubber Co.	86	92
United States Rubber Co., preferred	110	111

METALWOOD MANUFACTURING CO.

Improvements under way for the Metalwood Manufacturing Co., Detroit, Michigan, involve the rebuilding of the central portion of the company's plant, which will give approximately 6,000 square feet of floor space. A 10-ton traveling crane will also be installed, to facilitate handling the work. These improvements are necessitated by the rapid growth of the business, and we are advised that among recent orders of the Metalwood company were repeat orders from the Goodyear Tire & Rubber Co., Akron, Ohio, for Metalwood duplex vulcanizing presses and from Gutta Percha & Rubber, Limited, Toronto, Canada, for Metalwood quick operating remote control type valves.

RUBBER COMPANY DIVIDENDS.

The American Tire Fabric Co. paid a regular quarterly dividend of 1¾ per cent on preferred stock on October 2 to stockholders of record September 20.

The Globe Rubber Tire Manufacturing Co. has declared the regular semi-annual dividend of 3½ per cent on the preferred shares, payable November 1, to stockholders of record Oct. 27.

The B. F. Goodrich Co. has declared a dividend of $1.75 per share on preferred stock, payable January 2, 1917, to stockholders of record December 21, 1916, and a quarterly dividend of $1 per share on common stock, payable February 15, 1917, to stockholders of record February 2.

The Goodyear Tire & Rubber Co. paid the usual quarterly dividend of 1¾ per cent, on October 1 to stockholders of record September 20.

The Hood Rubber Co. paid a bi-monthly dividend of $1 on common stock on October 14.

The Keystone Tire & Rubber Co. paid a quarterly dividend of 2 per cent and ¼ per cent additional on its preferred stock and a quarterly dividend of 2 per cent on the common stock, with ¾ per cent additional, on October 2, to stockholders of record September 8.

A quarterly dividend of 2 per cent was paid by the Miller Rubber Co. on October 20 to stockholders of record October 1.

The New Jersey Zinc Co. has declared a quarterly dividend of 4 per cent, and an extra dividend of 5 per cent, both payable November 10, to stockholders of record October 31.

The Pennsylvania Rubber Co. has declared dividends of 1¾ per cent on the preferred stock and 1½ per cent on common stock, payable January 1, 1917.

The Ten Broeck Tyre Co., Louisville, Kentucky, has declared a 4 per cent dividend. This marks the resumption by the company of the payment of dividends which had been interrupted by the outbreak of the war and unsettled business conditions.

The United States Rubber Co. paid a quarterly dividend of 2 per cent on first preferred stock and a quarterly dividend of 1½ per cent on second preferred stock on October 31 to stockholders of record October 14.

The Westinghouse Electric & Manufacturing Co. paid the regular quarterly dividend of 1¾ per cent on preferred stock on October 16 and 1½ per cent on common stock October 31, both dividends payable to stockholders of record October 6.

The directors of the Lee Tire & Rubber Corporation have declared a quarterly dividend of 50 cents per share and an extra dividend of 25 cents per share, payable December 1 to stockholders of record November 15.

TRADE NOTES.

The Manhattan Rubber Manufacturing Co., Passaic, New Jersey, has increased its capitalization from $1,000,000 to $2,000,000.

The Reading Rubber Manufacturing Co., Reading, Massachusetts, has recently installed a well at its plant which was put down 303 feet, approximately 250 feet of which was through solid rock. The diameter of the well is 8 inches, and it gives a yield of about 70 gallons without lowering the level from the surface greater than 14 feet. A second well is being built by the company, from which equally good results are expected.

F. Bierman & Sons Metal & Rubber Co., St. Louis, Missouri, has a new building ready for occupancy, equipped with facilities which will enable this firm to handle all shipments with more promptness than heretofore. The building is of brick construction, two stories high, 65 by 100 feet in dimensions.

The Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pennsylvania, has sent out a notice that it will redeem at the rate of $1,050 and accrued and unpaid interest for each bond of $1,000 face value, all of its convertible sinking fund 5 per cent gold bonds of 1915 issued under the trust indenture dated July 28, 1915, and outstanding on January 1, 1917.

When enlargements now in progress at the Kimmel felt factory at Kitchener (formerly Berlin), Ontario, are completed, all the manufacturing of the Canadian Consolidated Felt Co., Limited, will be done in the Kimmel factory, and the old Berlin felt factory will be used entirely for warehouse purposes.

Additions to present buildings of the Rotch Mills department of the Passaic Cotton Mills at New Bedford, Massachusetts, are almost completed and a new spinning and weaving building is also in course of erection. Taylor, Armitage & Co., Inc., 120 Broadway, New York City, are the selling agents.

The Advance Felt Specialty & Cutting Co., Chicago, Illinois, has recently accomplished its second move within the last 18 months, the changes being due to the rapid growth of the business. In the new quarters at 318-322 South Jefferson street, the company occupies a two-story building of brick construction with full concrete basement, equipped throughout with specially designed machinery for the cutting, stripping and punching of rubber, felt cloth, and analogous materials.

The Armstrong Rubber Co., Inc., Newark, New Jersey, has a plant 75 by 98 feet which has recently installed equipment for the manufacture of regular and molded automobile inner tubes and rubber specialties for the trade, including two 150-horsepower boilers, one 200-horse-power electric generator and an Ingersoll Rand compressor. The calenders and mills are each driven by a separate motor drive, and the plant has an up-to-date Grinnell sprinkler system.

Gutta Percha & Rubber, Limited, Toronto, Canada, has recently purchased the property on which its offices and warehouse are situated in Saskatoon.

The Bibb Manufacturing Co., Macon, Georgia, has increased its capital stock from $1,500,000 to $2,500,000 out of accumulated surplus, on account of extensive enlargements at the Columbus factory of the company.

It is proposed to erect 20 dwellings to house the employes of the National Rubber Co., Pottstown, Pennsylvania, and to that end J. C. Feist, of the company, recently purchased a 60-acre tract on the outskirts of that city, the property being a part of the estate of the late Joshua B. Lessig.

The Belmont Packing & Rubber Co. will shortly erect a plant at Butler and Janney streets, Philadelphia, Pennsylvania. The offices of the company are located at 139 North Second street in that city.

The Republic Rubber Co., Youngstown, Ohio, has offered 10,475 shares of its common stock pro rata, at par, to its common stockholders. The proceeds, about $1,000,000, will be used for working capital and extensions.

The Milwaukee Engineers' Club, consisting of members of the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the American Chemical Society held its first meeting of the season in the new engineering building of the Federal Rubber Co., Cudahy, Wisconsin. A paper on "The Growing and Gathering of Rubber Latex" was read by L. J. D. Healy, chief chemist of that company, and the members, numbering 183, were taken through the factory where the process of manufacture was followed from beginning to end, after which luncheon was served.

PERSONAL MENTION.

Collier W. Baird, treasurer of the Rubber Trading Co., 9-15 Murray street, New York City, and a member of Troop A, First Squadron Cavalry, N. J. N. G., returned last month after a four months' tour of duty at Douglas, Arizona.

Edward Bers, of the firm of E. Bers & Co., Philadelphia, Pennsylvania, dealers in scrap rubber and metals, has been sojourning at French Lick Springs, Indiana, for a brief vacation.

P. W. Day has been appointed sales manager of the F. S. Carr Rubber Co., of Canada, Limited, Granby, Quebec.

Frederick J. Hall, formerly second vice-president of the Habirshaw Wire & Cable Co., that was merged with the Electric Cable Co., is now manager of the cable engineering department of the new company, the Habirshaw Electric Cable Co., Inc., with headquarters at 10 East Forty-third street, New York City.

Michael Minns, for some years identified with the sales department of the B & R Rubber Co., has recently been appointed sales manager of the Quabaug Rubber Co., North Brookfield, Massachusetts, which purchased the business of the former mentioned company.

William L. Wadleigh, head of Wadleigh Co., Limited, Singapore, after a sojourn of five months in the United States, will sail from San Francisco, California, November 11, on the "Tenyo Maru." He expects to arrive in Singapore, December 21.

WINDOW PUBLICITY OF THE UNITED STATES RUBBER CO.

The windows of the United States Rubber Co., in New York City, are in charge of a truly ingenious and artistic window dresser. The many products of this company seem to be displayed without partiality. A whole window is given to a single line or article, and the goods are surrounded by appropriate accessories and backgrounds. Lay figures, life size, are used, where they can be, to advantage. Tires for automobiles, motorcycles and bicycles have been shown. Belting, life preservers, outing shoes, boots and shoes, and bathroom accessories, are among those recently shown. The Brazilian forest has been represented, also a model of the plantation of the United States Rubber Co. in Sumatra.

A BIG USER OF RUBBER TIRES.

The Fifth Avenue Coach Co., which operates 132 motor-buses in New York City, has just published its annual report for 1915-1916.

A feature brought out in this report is that the 132 buses ran at a cost of only 21 cents per bus mile, each bus using six tires, the rear wheels each having two tires. This cost per mile is based on a mileage of 4,966,690.36 miles. New tires purchased by the company during the fiscal year covered by the report cost $54,533.63.

A CORRECTION.

In the October number of THE INDIA RUBBER WORLD appeared a statement by its Trenton correspondent regarding the Post Tire & Rubber Co., that on further investigation proves erroneous. THE INDIA RUBBER WORLD is very glad to take this occasion to contradict it.

KELLY SPRINGFIELD COMPANY TO MOVE.

It is practically settled that the Kelly-Springfield Tire Co., now at Akron, Ohio, will occupy a new factory to be built specially for it at Cumberland, Maryland, with the probability that eventually the entire manufacture will be centered there. It is understood that building operations will be begun at once.

NEW INCORPORATIONS.

Alliance Tire & Rubber Co., Inc., September 19 (Delaware), $2,500,000. William F. O'Keefe, George G. Steigler, E. E. Wright—all of Wilmington, Delaware. Principal office, 901 Market street, Wilmington, Delaware. To manufacture and deal in automobile tires, tubes and accessories.

The Alliance Tire & Rubber Co., Inc., October 9 (Ohio), $2,500,000. Milton Bejach (president and general manager); John C. Shively (vice-president); Walter H. Christensen (secretary and superintendent); John B. Pow (treasurer), and Frederick W. Throssell. Principal office, Alliance, Ohio. To manufacture automobile tires and rubber goods.

Apex Tire & Rubber Corporation, September 28 (Delaware), $100,000. Levi Helms, Walter J. Pollock, and Joseph A. McCarthy, 1092 East Third street, Brooklyn, N. Y. Principal office, Corporation Trust Co. of America, 394 duPont Building, Wilmington, Delaware. To manufacture rubber tires and inner tubes for automobiles and other vehicles.

Automobile Salon, Inc., The, September 28 (New York), $25,000. Hjalmar A. Holm, 672 Park Place; August Engel, 592 Vanderbilt avenue—both in Brooklyn, N. Y., and George Alonzi, 1464 First avenue, New York City. Automobiles and accessories.

Chicle Gum Co., September 6 (Delaware), $300,000. John H. McBride, 243 W. 76th street, and Hugh Francis Doris, 214 W. 70th street—both in New York City, and John Wynne, 501 Court street, Brooklyn, N. Y. Principal office with M. McLaughlin, 827 Spruce street, Wilmington, Delaware. To manufacture and deal in rubber and vegetable products, chemical compounds, etc.

Colonial Tire & Rubber Co., Inc., September 25 (New York), $25,000. J. B. Crockett and Amos White, 44 Whitehall street, and Ira W. Henry, 149 Broadway—both in New York City. To manufacture and deal in tires.

Dayton Tire Sales Co., Inc., September 28 (New York), $10,000. Elbert R. Detamble and John A. Pontolillo, 1764 Broadway, and Bailey C. Elliott, 1400 Broadway—both in New York City. To deal in rubber tires, etc.

Fero's Broadway Store, Inc., September 27 (New York), $10,000. James J. Fero and William A. Miller, 792 Seventh avenue, and Alfred Hines, 1074 Lexington avenue—both in New York City. To manufacture and deal in automobile tires, accessories, etc.

Goodrich Auto Service Corporation, F. W., September 22 (New York), $75,000. Frank W. Goodrich, 312 East 58th street; Peter V. Hoyt, 745 St. Nicholas avenue, and Henry W. Showers, 15 Wall street—all in New York City. To deal in tires, auto supplies, etc.

Hygrade Rubber Co., Inc., October 16 (New York), $10,000. J. F. Kraeutler, Jr., 66 Beaver street, New York City; H. L. Goldbaum, 461 Edgecombe avenue, Bronx, N. Y., and George Kuhlmann, 925 St. Marks avenue, Brooklyn, N. Y. To manufacture rubber goods.

Keystone Rubber & Tire Co., Inc., August 12 (Delaware), $500,000. M. R. Haymaker, Wilkinsburg; S. W. Crosby, 20th avenue, Homestead, and R. S. Robb, Aspinwall—all in Pennsylvania. Principal office, Keystone Building, Pittsburgh, Pennsylvania. To manufacture tires, etc.

Merit Raincoat Co., Inc., October 20 (New York), $1,200. Morris Duglin, 828 Longwood avenue; Kassiel Spinner, 700 Cauldwell avenue—both in Bronx, and Louis Kimmel, 499 Riverdale avenue, Brooklyn—both in New York. To manufacture rubber apparel, etc.

National Cover Co., Inc., October 7 (New York), $1,200. Isaac Raffelson, 1471 Vyse avenue, Bronx, N. Y; Samuel Greenberg, 400 West 160th street, and Abraham Kruckman, 166 West 141st street—both in New York City. To manufacture slip covers for tires, seats, etc.

National Insulate Co., Inc., October 16 (New York), $50,000. Peter Meyer, 105 West 120th street, and Simon S. Hamburger, 320 Broadway—both in New York City, and Isaac S. Beck, 767 Tinton avenue, Bronx, N. Y. To manufacture insulating material, etc.

Orville Rubber Co., September 26 (Delaware), $150,000. Morgan Howells, Bucyrus; E. B. Cornell and E. A. Homeier, Cleveland—both in Ohio. Principal office, Capital Trust Co. of Delaware, Dover, Delaware. To manufacture automobile tires, inner tubes, etc.

Osler Racine Rubber Co., September 22 (California), $100,000. J. S. Bennett, Hebermain Building, Los Angeles, California. Principal place of business, Los Angeles, California. To manufacture rubber goods, tires, and to do a general rubber business.

Panther Rubber Co., Limited, September 15 (Canada), $100,000. Charles A. Joslin and others of Sherbrooke, Quebec, Canada. Principal office, Sherbrooke, Quebec, Canada. To manufacture rubber heels, soling, patching and molded goods. It is also the intention of the corporation to purchase the Canadian business of the Panther Rubber Manufacturing Co., Stoughton, Mass.

Perfection Tire & Rubber Co., September 23 (Delaware), $15,000,000. C. R. Cole, 6029 Indiana avenue; Charles W. Harris, 732 Marquette Building—both in Chicago, and K. S. Wilson, Oak Park—all in Illinois. Principal office with Reynolds Clough, Esq., Dover, Delaware. To manufacture and deal in automobiles, tires, accessories and specialties.

Rubber Tire Sales Co., Inc., September 7 (New York), $20,000. Walter Ulrich, John F. Forrester, William O'D. Langley—all of 346 Broadway, New York City.

Southwestern Rubber Co., September 15 (Missouri), $5,000. H. A. Young and G. F. Knight, Kansas City, Missouri; Ransom Stephens, C. D. Darrigrand, and Fred P. Darrigrand, Wichita, Kansas, and D. P. Richardson, Union, Oklahoma. Principal office, Kansas City, Missouri. To do general tire repair business, to operate a tire repair school, to manufacture inner tubes, auto tire sundries, and Ford size tires in wrapped tread type.

Standard Tire Valve Co., September 13 (Massachusetts), $100,000. Michael F. Clarke and John F. Luther, 40 Central street, and John W. McCormack, Tremont Building—both in Boston, Massachusetts. Principal office, Boston, Massachusetts. To manufacture and deal in tire valves, motor vehicles, and engines and machinery in connection therewith.

Thing & Co., G. E., Inc., October 16 (New York), $25,000. George H. Mayo, and Henry B. Hubbard, 1790 Broadway, New York City, and J. F. Barnes, 37 Pearl street, Buffalo, N. Y. Principal office, Buffalo, N. Y. To deal in leather and rubber goods.

Tire Co. of Philadelphia, Inc., October 5 (New York), $6,000. Sydney Bernheim, 35 Nassau street, New York City; Catherine A. Weldon, 591 Seventh street, and Harry H. Jacobson, 555 Grand street—both in Brooklyn, N. Y. To manufacture rubber tires.

Universal Tire & Rubber Co., September 8 (Delaware), $1,000,000. John Chamberlin, George Davis, 51 Market street, Poughkeepsie, and Egbert B. Cresswell, 119 Eddy street, Ithaca—both in New York. Principal office, Corporation Trust Company of Delaware, Dover, Delaware. To manufacture and deal in rubber goods of every description, automobiles, etc.

TRADE NOTES.

At the annual election of the McGraw Tire & Rubber Co., held at the company's offices, East Palestine, Ohio, the following officers were elected: E. C. McGraw, president; R. W. McGraw, vice-president; John Morgan, secretary, and L. M. Kyes, treasurer. the shares of the common stock were increased from 20,000 to 40,000, changing the par value from $100 to $50 per share. The capital stock of the company was increased from $3,000,000 to $4,000,000 equally divided between common and preferred. A daily output of 5,000 tires is in early prospect.

The F. E. Partridge Rubber Co. has recently transferred its factories from Montreal, Quebec, to Guelph, Ontario, Canada, enlarged facilities being thus provided for the manufacture of the company's numerous lines of rubber goods, as well as special advantages for handling an increasing trade in druggists' sundries, automobile tubes and tire accessories. To its established range of trade-mark goods, the company has now added the manufacture of automobile tires.

The Firestone Tire & Rubber Co., Akron, Ohio, has purchased a lot at the corner of Broad and Kinney streets, Newark, New Jersey, and will build thereon a three-story structure 50 x 170 feet, to be used as a tire service station.

As soon as a satisfactory site is secured, the Sioux City Tire Manufacturing Co. will commence the erection of its plant, which will probably take the form of a three-story structure, 150 by 50 feet.

The Lapeer Commercial Club, of Lapeer, Michigan, is negotiating for the establishment of a tire manufacturing enterprise in that city, which is prepared to subscribe $25,000 toward a site and building.

P. H. Boalen, formerly manager of the automobile supply department of the Bailey Co., has recently been appointed head of the sales department of the Mason Tire & Rubber Co., 1806 Euclid avenue, Cleveland, Ohio. The factories of the company are at Kent, Ohio.

The Atlantic Tire & Rubber Co., Wilmington, Delaware, will change its name to Boone Tire & Rubber Co.

The $250,000 plant of the J. & D. Tire & Rubber Co., at Charlotte, North Carolina, is now nearing completion. The estimated output will be 350 tires a day. H. O. Smith is president of the company.

The Ackerman Wheel Co., founded by A. H. Ackerman, has organized a $2,500,000 corporation for the manufacture of the Ackerman wheel, a new device for the correction of tire troubles. The new wheel is equipped with spring steel spokes and solid tires. It is stated that negotiations for a $250,000 plant, at Cleveland, Ohio, have recently been closed.

It is stated that the capacity of the Morgan & Wright factory of the United States Tire Co., at Detroit, Michigan, where the Royal Cord tires are made, will be doubled by or before the incoming of 1917.

The Mutual Tire & Rubber Co., whose incorporation was noted in the October issue of THE INDIA RUBBER WORLD, is a coöperative organization, which offers its stockholders tires, which are the product of the company at a discount from list prices. The officers of the company are William McKay, president; C. E. Barker, vice-president and treasurer, and John Hall Jones, secretary. The executive officers are at 30 East Forty-second street, New York City.

The plant of the Lion Tire & Rubber Co., at LaFayette, Indiana, is approaching completion, and is expected to be in working order and producing tires and tubes before the first of the year. The building is of brick, two stories and basement, 100 by 180 feet. Calenders, washers and machinery have been installed for the production of 200 tires and tubes a day. The plant is excellently located, is 5 acres in extent, adjoining the Belt railroad, thus furnishing advantageous shipping facilities. The board of directors includes several of the leading business and financial men of LaFayette, Decatur and Peru, Indiana, and Chicago, Illinois.

Plans for the proposed Westgard Tire & Rubber Co., to be erected at Warren, Ohio, are being prepared by a well-known concern of Cleveland, Ohio, architects. The main building will consist of two stories and basement, 100 by 240 feet, of fireproof construction. The power plant will be a separate one-story building, 40 feet square.

PERSONAL MENTION.

The title of Joseph C. Weston, of the United States Tire Co., New York City, has been changed from general sales manager to director of sales, and O. S. Tweedy has been appointed general branch sales manager, instead of assistant general sales manager.

H. H. Grobe, formerly manager of the truck tire department of the Kelly-Springfield Tire Co. in New York City and territory, has been given charge of the Baltimore, Maryland, branch, beginning November 1. Mr. Grobe has been with the company for five years.

F. J. Loewe will be general manager of the new tire plant of the Brunswick-Balke-Collender Co. at Muskegon, Michigan.

John J. Kearns, a vice-president of the Fisk Rubber Co. and head of the research department, and two of his assistants, W. W. Whiting and John C. Cole, have resigned their positions with that company.

Horace W. Hakes, a well-known Michigan tire man, has taken the agency of the Republic Rubber Co., for western Michigan. Mr. Hakes is prominent in masonic and political circles.

Erwin Oberheu has been appointed manager of the Columbus, New Mexico, depot of The B. F. Goodrich Co.

Walter T. Sewell, sales manager of the Sewell Cushion Wheel Co., is making a trip through the East and will meet the branch selling organizations of the company in Pittsburgh, Baltimore, Philadelphia, New York and Boston, to discuss plans for the coming year.

F. W. Sherwood has been made assistant manager of the New York City branch of the Kelly-Springfield Tire Co. Mr. Sherwood is well known in the tire business, having previously been New York manager of the Gibney Tire & Rubber Co. He was also one of the early salesmen of the Diamond Rubber Co. and, later, truck tire manager for the Firestone Tire & Rubber Co.

CHANGES IN UNITED MOTORS CORPORATION.

William M. Sweet, for ten years general manager of the Motor and Accessory Manufacturers, the national organization of the accessory industry, of which tires form an important part, has become assistant to the president of the United Motors Corporation, New York City. This recently incorporated firm is a holding company with Delco, Hyatt, New Departure, Remy, Klaxon and Perlman as its subsidiaries. Mr. Sweet has assumed the management of the new corporation as the representative of the president and board of directors, and will doubtless find his previous experience of great value to him in the present development work along similar lines. While the board of directors felt compelled to accept Mr. Sweet's resignation as president, they elected him a member of the board to succeed Mr. Lovell, and he will serve until 1919. He was also elected chairman of the 1917 banquet committee.

L. M. Bradley, advertising manager of the "American Motorist," official publication of the American Automobile Association, has been elected general manager of The Motor and Accessory Manufacturers' Association, succeeding Mr. Sweet.

TRADE NOTES.

The Lee Tire & Rubber Co., Conshohocken, Pennsylvania, has recently erected a two-story addition, 80 by 120 feet, in which the dipped goods department is to be installed, the removal of this department from the tire building enabling an increase in tire production to about 2,000 tires per day. The new building is of the same construction as the main buildings, steel and concrete, so arranged that additional stories may be built at any time.

The capital stock of the Be Saw Tire & Rubber Co., Hartville, Ohio, has been increased from $150,000 to $220,000. The new issue is all preferred stock and the company contemplates using this new capital for additional buildings and equipment which will allow for an increase in the daily output of from 100 to 250 tires.

The Toledo-Findlay Tire & Rubber Co., Findlay, Ohio, has elected new directors for the ensuing year, as follows: C. I. Moffitt, L. W. Eckhardt, F. E. McMannus, H. O. Fellers, Charles Reick, A. O. Hamilton and V. T. Spitler, all local men. The company expects to manufacture automobile casings exclusively in the future.

The Kelly-Springfield Tire Co. of Indiana recently demonstrated the anatomy of its tires from the crude materials to the finished product, in a striking exhibit occupying six windows in the Merchants' Heat & Light Co.'s building in Indianapolis.

The Gillette Safety Tire Co., Eau Claire, Wisconsin, reports that its first factory unit, size 250 by 60 feet, is now completed, and a 50 by 80-foot office and laboratory building is in process of construction. It is expected that the installation of machinery will be completed in time to begin operations in December. Additional buildings will be constructed in the spring of 1917.

The Keystone Tire & Rubber Co., New York City, has increased its capital stock from $500,000 to $1,500,000.

The managers of the various tire branches in Cleveland, Ohio, met recently at a "get together" luncheon, inaugurated by C. A. Dunham, manager of the Cleveland branch of The B. F. Goodrich Co., and the affair was such a success that others of the kind will be given. Besides Mr. Dunham, those present were: L. L. MacAnaney, of the Republic Rubber Co.; Charles E. Ball, Portage Rubber Co.; J. H. Bolden, Mason Tire & Rubber Co.; W. H. Barcus, Fisk Rubber Co.; J. D. Hess, Jr., Firestone Tire & Rubber Co.; F. E. Workman, Kelly-Springfield Tire Co.; C. T. Black, Goodyear Tire & Rubber Co.; B. E. Aaronson, Hood Tire Co., and John W. Lawrence, of the Republic Rubber Co. of Cleveland.

Morgan Howells is said to be promoting a rubber company to be known as the Cornell Howells Rubber Co., to be located at Orrville, Ohio.

The American Spring Tire Co., located at 30 West Lake street, Chicago, Illinois, is placing the De Voll spring cushion tire on the market. This tire is a series of Swedish steel springs made to fit inside any outer casing now in use, with the cushioning inside the outer cover, eliminating the disadvantages of the double center. The spring cushions do not come in contact with the casings, but are suspended on four roller bearings, the function of which is to permit the tire to take the side thrust, as allowed by the air tube. It is claimed that in this tire, friction, blowouts, puncture and other ailments to which tires are subject are eliminated—a delightful if optimistic pretension. The tires are sold under a guarantee and it is estimated that a set of them will last the life of any car.

The stockholders of the Marion Tire & Rubber Co., Marion, Ohio, recently held their first annual meeting at which 125 stockholders were present. The treasurer's report indicated that the company was in good financial condition and prospects for continued success seemed excellent. The following members were re-elected to the board of directors: W. H. Heverstott, C. W. Fairbanks, J. W. Jacoby, D. H. Lincoln, J. L. Price, C. W. Mapes, A. H. Trout and W. T. Jones. H. L. Gilbert was also elected a director. The factory manager is Grant Lambright.

PERLMAN PATENT CONTESTED.

Details of the important Perlman demountable rim suit were given in THE INDIA RUBBER WORLD of May 1, 1916. That the question of the priority and legality of the Perlman patents may not yet be fully and finally established is indicated by the fact that two suits have been entered against the Perlman Rim Corporation, the later one being that brought by Louis De F. Munger, whose patent is dated December 5, 1899, and, therefore, has but a little over one month longer to run. The other suit is that of Erle K. Baker, of the Universal Rim Co., who is suing for infringement of several patents which involve the mounting of the rim upon a conical seat and the application of lateral pressure.

MID-CONTINENT TIRE COMPANY BUILDS.

The Mid-Continent Tire Manufacturing Co. has begun the erection of a $160,000 factory at Wichita, Kansas, which will have a capacity of 300 casings and 500 inner tubes a day. The main building will be 300 by 60 feet, two stories high, and there will be two other buildings besides the main one, a power plant and vulcanizing plant, all constructed of reinforced concrete, and fireproof. More than $50,000 worth of machinery has already been purchased.

At a recent directors' meeting, Henry Lassen, president of the Kansas Milling Co., was elected president of the Mid-Continent company. Ransom Stephens is vice-president and secretary; Charles Darrigrand, treasurer pro tem, and general manager.

RACINE RUBBER CO. ELECTIONS.

Stuart Webster has been elected president of the Racine Rubber Co., Racine, Wisconsin, succeeding H. L. McClaren, resigned. Mr. Webster, who has been with the company since it was organized in 1910, was formerly treasurer and later vice-president, in which office he is succeeded by Louis T. Vance. H. C. Severance remains as secretary and treasurer.

NEW CORPORATION TO TAKE OVER POLACK COMPANY'S BUSINESS.

The Polack Truck Tyre Corporation has been organized under the laws of New York State, with a capitalization of 100,000 shares with no par value, to acquire the assets and business of the Polack Tyre & Rubber Co., Bridgeport, Connecticut. Forty thousand shares will be offered for sale, the proceeds of which will be used for erection and equipment of a new plant to handle steadily increasing business.

The Polack Tyre & Rubber Co. was incorporated in 1912 and acquired the manufacturing rights, formulæ, secret processes, patents, etc., of the European Polack Co., and is now operating 26 active branches in the largest cities of the United States and Canada. Hugo Hoffstaedter, president of this company, will become president of the new corporation, which will also retain the manufacturing and sales organization of the present company.

NEW PENNSYLVANIA TIRE COMPANY.

The Keystone Rubber & Tire Co., Inc., Pittsburgh, Pennsylvania, notice of whose incorporation appears elsewhere in this issue, owns a steel and brick factory, valued at $125,000, and three acres of ground at Penn, Pennsylvania, on the main line of the Pennsylvania Railroad. An option on 12 adjoining acres allows for future expansion. The plant is being fully equipped and production of the "Keystone" tire will be begun within a short time. The company will employ 600 people, working in three 8-hour shifts.

THE RUBBER TRADE IN AKRON.

By Our Regular Correspondent.

THE annual sales convention of the Firestone Tire & Rubber Co., held during the past month, was the biggest and most successful in the history of the company, about 500 salesmen and agents, from all parts of the United States, and from Canada, England, Australia, Cuba, South America and Europe, gathering at the Akron factory. There were important business sessions, including a close study of Firestone methods and factory work, and addresses were made by H. S. Firestone, president; R. J. Firestone, general sales manager; A. G. Partridge, assistant sales manager, and others. The Firestone clubhouse was lined with exhibitions by the factory departments, and the factory buildings and all rooms in which meetings were held were decorated with the colors of the company, red and black. Banquets, luncheons and sight-seeing trips, including visits to the larger industries of the city, were also enjoyed.

Action on the proposed increase of capital to $50,000,000, and declaration of a 700 or 800 per cent dividend, of the Firestone company has been delayed until November 2, owing to the fact that stockholders cannot vote legally on an increase in capitalization until after November 1, the last day of the period set for retiring the present preferred stock. It is reported that the proposed new stock issue will be offered to the public through the Cleveland Trust Co., Cleveland, Ohio. The transaction is unique in Akron rubber company financing, as it is the first large issue carrying as low a dividend rate as 6 per cent.

The Firestone company has purchased 150 acres adjacent to the factory for a new power house and additional factory buildings. For every addition wood models are made from blue prints, and exhaustively inspected by officers of the company before actual building commences.

A recently acquired 500-acre tract, to be called "Firestone Park," is laid out with park spaces and reserved tracts for churches and schools, while unusually large home lots are being sold to the employes at 10 per cent down.

At the recent dedication of the Firestone clubhouse, restaurant and gymnasium, H. S. Firestone and Mayor Laub were the chief speakers.

Machinists in the employ of the Firestone company have been granted an eight-hour day and a slight increase in wages over the ten-hour day.

* * *

Actual shipments of products of The B. F. Goodrich Co. for the eight months to September 1 amounted to approximately $50,000,000, a gain of 40 per cent over the same period of last year, and it is predicted that a total over-turn of $77,000,000 may be reached this year.

Completion of the fifty-eighth building in the Goodrich factory group will bring the total floor space occupied by this plant up to 4,024,329 square feet, or 92.3 acres. The latest building will have six stories and basement, and will be of brick and concrete construction, almost identical with two other recently completed buildings. It will be 360 feet long, 100 feet deep and 101 feet high above the street level, with 252,000 feet of floor space and a window area of 42,315 square feet. A bridge will connect each floor of this new building with one of the others.

C. R. Serfass, formerly manager of the Columbus, New Mexico, branch of the Goodrich company, has been transferred to Akron.

* * *

The General Tire & Rubber Co. has increased its capital stock from $200,000 common stock to $500,000 total capital, divided into preferred stock to the amount of $200,000 and common stock to the amount of $300,000. The company now has on order for delivery in the spring, additional equipment which will double the capacity of the present plant. This equipment will be installed in two additions now being erected, one 60 by 60 feet, three stories in height, and the other a one-story building of saw-tooth construction, 60 by 250 feet in dimensions.

At a special meeting of directors of the General Tire & Rubber Co. held on September 16, the directorate was increased to seven members by the election of G. F. Burkhardt, of Akron, and J. A. Diebolt, of Cleveland. Charles Herberich, vice-president and treasurer of the Depositors Savings & Trust Co. in this city, was elected treasurer. Other officers of the company are: M. O'Neil, president; William O'Neil, vice-president and general manager, and W. E. Fouse, secretary.

* * *

The Star Rubber Co. has been reorganized, with a capital stock of $400,000, of which $200,000 is preferred and $200,000 common. This company has been manufacturing druggists' sundries and automobile tires and tubes in a small way for some years, and with the reorganization, the sundry line will be discontinued, and the output of tires and tubes greatly increased. It is expected that the company's new tire will be on the market about December 1. The new officers are as follows: L. H. Firey, president and treasurer; R. N. Robinson, vice-president; J. B. Huber, secretary, and Fred Gostlin, factory manager.

* * *

Net sales of the Swinehart Tire & Rubber Co. during its last fiscal year, totaled $1,680,000, according to the annual report presented to the directors on September 28. The company is now making 500 tires a day, and is showing an increase of 20 per cent in business. The following were elected directors: B. A. Polsky, Fred Snyder, W. M. Weldon, Charles Currie, T. E. Barry, Dr. E. L. Mather, T. F. Walsh, F. S. Long and R. E. May. Officers were reëlected.

* * *

The Mohawk Rubber Co. is adding a new floor approximately 80 by 150 feet, to an old building, and a three-story annex to one of the recently completed buildings comprising its plant. The total cost of these additions will be about $60,000, and new machinery, including boilers, calenders, mills, etc., sufficient to increase the present capacity about 50 per cent will bring the expenditure in the neighborhood of $125,000.

W. J. Smith, of the Mohawk's Akron staff, has been placed in charge of a new Kansas City branch opened by the company last month.

* * *

The capital stock of the Akron Rubber Mold & Machine Co. has been increased from $60,000 to $300,000, owing to the rapid growth of its business. Extensions to the company's plant are under consideration.

* * *

V. C. Blandin, Akron representative of Pell & Dumont, crude rubber dealers, 68 Broad street, New York City, will occupy new offices in the Ohio building after November 1.

* * *

An interesting and instructive feature of the annual sales conference of the Goodyear Tire & Rubber Co. held early last month, was an elaborate exhibit tracing the tires and other products of the company from the tropical jungles to the finished product.

In order to secure its own water supply for the power plant and immense battery of vulcanizers, the Goodyear company has purchased a lake, 100 acres of land, and has secured easements of land around another lake.

W. E. Finney, formerly manager of the Goodyear branch at St. Louis, Missouri, has been assigned to the mechanical goods department at the home factory.

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The appointment of Clyde S. Thompson as advertising direc-

tor of the Miller Rubber Co. is the first step in an extensive advertising campaign about to be launched by the company.

* * *

A novel method of advertising mileage records is being carried out by the Amazon Tire & Rubber Co., a Haynes racing car traversing the streets of this city equipped with the company's tires and bearing signs reading "Testing Amazon Anti-blowout Tires. Mileage to date ——." A blank space is left for the figures, and each day the mileage is chalked on the sign.

* * *

The Kelly-Springfield Tire Co. is erecting a 50 by 50-foot, two-story addition to its plant at Wooster.

* * *

The Rubber Products Co., of Barberton, has increased its capital stock from $300,000 to $500,000, to care for increased business in "Stronghold" tires and in the druggists' sundries line.

* * *

The Marathon Tire & Rubber Co., at Cuyahoga Falls, has increased its capital stock from $500,000 to $1,000,000. This company is progressing fast, the business for its fiscal year ending August 31, showing an approximate increase of 70 per cent over the year previous.

THE RUBBER TRADE IN BOSTON.

By Our Regular Correspondent.

BOSTON rubber manufacturers, and by that is meant that large list of manufacturers who market their goods here, or whose factories are situated in eastern Massachusetts, are, without exception, busy. There is no branch of the trade which is languishing because of lack of demand. On the contrary, many manufacturers have all the orders they can fill, and some have more—much more—goods ordered than it will be possible for them to make and ship before the season for their use has passed.

* * *

The present situation in the rubber footwear trade was explained to the members of the New England Shoe Wholesalers' Association at a luncheon given in this city October 11, by George Hutchinson, of the W. H. McElwain Co. He stated that to-day's conditions are not due to any scarcity of crude rubber, nor to any lack of adequate capital or plant facilities on the part of rubber companies. The principal trouble, he attributed to labor scarcity, although this, of course, applies to practically all industries. In Connecticut, for example, rubber factory workmen who formerly received from $2 to $2.25 a day, are now getting $3.50 to $4, and it is found also that parents whose daughters have been working in rubber factories in order to help out the family income, are not willing, in these prosperous times, that they should work as many hours a week as formerly. As illustrating the inability of some of the rubber companies to meet current demands, Mr. Hutchinson stated that recently one of these concerns had been obliged to refuse an attractive order for rubber tires, amounting to $300,000, because it could not guarantee deliveries.

"Some of our manufacturers," said Mr. Hutchinson, "are finding it about as bad to have too much business as to have too little."

* * *

According to the balance sheet of the Boston Woven Hose & Rubber Co., dated September 1, the volume of net business for the year was $6,101,462. The surplus and guarantee is $1,220,116, as compared with $1,684,411 on September 1, 1915. During the year under consideration, the capital stock was increased from $2,000,000 to $2,750,000 by a stock dividend representing a transfer from surplus earnings of $750,000.

New buildings and machinery valued at $322,710 have been added to the plant and charged to earnings for the past year.

The assessed value of the land is $160,900, while value of buildings is $1,761,219, a total of $1,922,119 from which there is deducted the sum of $533,046 as a reserve for depreciation, leaving $1,389,072, which is the net figure carried in the balance sheet. The same policy is followed with respect to the item of machinery and tools amounting to $1,664,282, from which $879,176 is deducted as a reserve for depreciation.

* * *

In a neat frame in the office of Vice-President Greene, of the American Rubber Co., at the Essex street office in this city, is a motto or sentiment reading: "The man who has the right to criticize also has the privilege to commend." This is signed with the initials "N. L. G." Those who attended the banquet given to the salesmen by the United States Rubber Co. last December will remember the slogan of that occasion: "Are We Downhearted?" "No!" "How Is Every Little Thing?" "Fine!"

N. L. GREENE.

The author of the slogan, the man who put the questions and received the thunderous answers, was N. Lincoln Greene, whose whole business life, with the exception of a few months, has been spent in the rubber trade. He was born in Boston in 1871 and educated in the public schools of that city. He attended the Boston Latin School preparatory to entering Harvard University, but on account of illness relinquished that plan and in August, 1889, became errand boy for Joseph W. Woods, a cotton broker. This lasted but a short time, when he entered the employ of Houghton, Coolidge & Co., Boston, who were then agents for the Para Rubber Shoe Co. He remained with that firm until the death of A. L. Coolidge, its president, when he resigned his position to go with the Boston Rubber Co., which then manufactured clothing at Chelsea and footwear at Franklin, Massachusetts. When this company was bought out by the United States Rubber Co. in 1892, the latter company continued to manufacture the brands of clothing formerly made by the Boston Rubber Co., having them made at the American Rubber Co.'s factory in Cambridge, Massachusetts. This factory was under the management of S. Lewis Gillette. Mr. Greene became his right-hand man, and in 1911 succeeded him as manager of the clothing department of the American Rubber Co. Under Mr. Gillette's management there were but three clothing salesmen. Since that time the number of salesmen handling that specialty has increased to ten, with a 300 per cent increase in the business.

In January, 1916, the American Rubber Co. and the Stoughton Rubber Co. consolidated. Mr. Greene was made vice-president of both companies and manager of the clothing department. In his present position he not only attends to the manufacturing, buying and selling of the American and Stoughton brands, but also to the clothing manufactured at the Goodyear India Rubber Glove Manufacturing Co., at Naugatuck, Connectitcut, the carriage cloth made at the Boston Rubber Shoe Co.'s factory at Malden, Massachusetts, and the topping manufactured at Goodyear's Metallic Rubber Shoe Co., at Naugatuck.

Prior to assuming his present position, Mr. Greene had a wide experience as a salesman, having sold clothing in every State in the Union, in Canada and Mexico, and also traveling in Europe as special representative of the United States Rubber Co. His only business trips now are to the meetings of the clothing salesmen in Chicago, Illinois, and New York City in August and February of each year. He is a member of several clubs, is fond of out-door sports, is an enthusiastic golfer, and has a host of friends and a wide-spread business and social acquaintance.

* * *

The more automobiles, the more tires. Therefore the traffic census of the Massachusetts State Highway Commission is of interest to the tire trade. In the last six years, this report says,

horse-drawn traffic has decreased 5 per cent per year, while motor vehicle traffic has increased 70 per cent per year. This is the result of a systematic count, taken at 238 points, 14 hours per day, for seven days. In 1912 the proportion was 63 per cent motor vehicles and 37 per cent horse-drawn. The 1915 census of traffic showed 82½ per cent motors and 17½ per cent horse vehicles. During the six-year period the total traffic increased 145 per cent, but motor vehicles increased 420 per cent and horse vehicles decreased 30 per cent. There were practically no motor trucks in 1909, but the increase from 1912 to 1915 was 230 per cent.

These are accurate figures. They apply to 1915. Any one at all familiar with the trade knows that 1916 should show an even greater proportionate increase over the previous year. It would not seem far out of the way to estimate an increase of 100 per cent this year over last, and a proportionate augmentation of the tire business.

* * *

The Standard Woven Fabric Co., manufacturer of "Multibestos" products, and rubber specialties, which recently acquired the plant of the Walpole Rubber Co., at Walpole, has sold its plant at Framingham to the Bela Body Co., manufacturer of automobile bodies, which will remove there from Amesbury, Massachusetts.

* * *

The Lations Manufacturing Co., of Worcester, manufacturer of suspenders and other elastic webbed goods, has moved to larger quarters, having leased some 6,100 square feet of floor space in the new addition of the New England Corset Co.'s building, on Green street, in that city. This change will more than double the capacity of the first-mentioned company.

* * *

The plant formerly occupied by the Bemis Rubber Co., near Bemis station, in Watertown, has been sold to the Sawyer Products Co. of East Cambridge. The premises consist of 2½ acres of land, and factory buildings with an aggregate floor space of about 17,000 square feet. There is also a railroad siding connecting with the Boston and Maine railroad. The new owners will make extensive improvements and will operate the factory in the manufacture of an entirely new product.

* * *

Merton A. Turner, sales manager of the Monatiquot Rubber Works Co., South Braintree, Massachusetts, and Miss Olive H. Grant were married at the residence of the bride, in Braintree, on October 11. The marriage was a quiet one, only immediate relatives of the bride and groom being present. The honeymoon was spent on an automobile trip. Mr. Turner has a host of friends in the trade who are sending congratulations.

* * *

Charles W. Barnes, of the New York City office of the United States Rubber Co., was in Boston a week ago on a sad errand. He was a resident here previous to his transfer to the head office, and his aged mother made her home in Cambridge. Last month the old lady, ninety years of age, visited friends in New Glasgow, Nova Scotia, and on the 19th, died in a house but a short distance from the one in which she was born. Mr. Barnes brought the body to this city for burial.

* * *

Frederick C. Hood, of the Hood Rubber Co., opened the attractive grounds of his estate, in Brookline, the 7th of last month, for the exhibtion of puppies by the Airedale Terrier Club of New England. Mr. Hood's estate was an ideal place for the show, the residence situated at the top of a hill, and the judging ring was one of the terraces leading to the garden. Mr. Hood was awarded a prize for his "Boxwood Bingley Bountiful."

* * *

Ira A. Burnham, vice-president of the American Rubber Co., is nursing a broken collar bone, the result of an automobile accident. Mrs. Burnham had three ribs fractured at the same time.

THE RUBBER TRADE IN TRENTON.

By Our Regular Correspondent.

TIRE manufacturers here are much interested in the Egan good roads bill, which is to be voted upon by the people of New Jersey at the November election. The bill provides for the appropriation of several millions of dollars to be expended in building good roads from one end of the State to the other. One of the results of the law's enactment, it is believed, would be a big boost to the auto and, consequently, to the tire business.

* * *

An electrical show will be held in Masonic Temple, December 6, at which time there will be a display of insulated wire and hard rubber goods used in connection with electrical devices.

* * *

William R. Thropp & Sons, Co., the well-known rubber machinery house, has found it necessary, owing to the increase of its business, to purchase additional real estate, adjoining its plant, on East State street.

* * *

John M. Miller, for 17 years with the Empire Rubber Tire Co., of this city, has been appointed manager of the Cleveland, Ohio, plant of the Polson Rubber Co. He will enter upon his new duties the first part of November.

* * *

Dale O. Pohlman, sales manager of the Thermoid Rubber Co., returned about the middle of last month from a trip during which he visited the St. Louis, Indianapolis, Chicago and Detroit branches of the company.

* * *

J. M. Dawson has been placed under arrest here on the charge of passing bogus checks, some of which he is said to have used to defraud people in the rubber trade. According to the police, Dawson obtained a facsimile of the checks used by the Crescent Insulated Wire & Cable Co. Several checks, alleged to have been passed by Dawson, were received, in due course by the First National Bank of Trenton and were declared to be forgeries.

* * *

The John A. Roebling Sons Co., of this city, has leased a five-story and basement warehouse at 223-227 Arch street, Philadelphia, Pennsylvania. The building, it is said, will be used for making wire goods and for storage purposes.

THE RUBBER TRADE IN RHODE ISLAND.

By Our Regular Correspondent.

WHILE the several rubber factories throughout the State continue to report an unprecedented business activity, the increasing scarcity of desirable help is causing considerable worriment. Goods of every description are being shipped in large quantities daily, and to all parts of the world. Rubber shoes of all kinds are being distributed to every section of this country and to many foreign ports. Tennis shoe orders are large.

* * *

Some time ago the employes of the Revere Rubber Co., Olneyville, with the assistance of the officials, formed a "safety first" committee, and great strides are being made in the company's plant in the work of protecting the employes. In a large rubber manufacturing establishment such the Revere company's, accidents are more or less numerous, because of the number of grinding and other large machines. The "safety first" body has been going through the plant in a systematic manner, covering up the dangerous parts of the machinery, and educating the employes to be more careful at their daily toil and to take better care of themselves. As a result of this work, the number of accidents has been reduced, until the hospital of the plant, a modern improvement recently established, is amply able to attend to all the cases.

The committee, having in mind the health and physical well-being of the employes, has organized a "keep clean" sub-committee whose duty it will be to see that all of the working, wash and toilet rooms are kept as clean as possible. This committee is already doing much good among the employes, and it is predicted that this will be one of the model plants of the entire United States Rubber Co.'s system of factories within the coming year.

* * *

The new brick addition to the vulcanizing department of the National India Rubber Co.'s plant at Bristol, is very nearly completed and will be ready for use before the end of the year. The new vulcanizers are now being placed in position in the addition.

John W. Church, for many years connected with the business affairs of the National India Rubber Co., and more recently head of the traffic department, has accepted a position with Peckham Bros., automobile and supplies dealers, Providence. He is succeeded by W. L. Dudley, of Woonsocket, who has had several years' experience in the business.

Chester R. Colwell, who for several years has been in charge of the carpentering department at the National factory, has resigned to accept a position in Providence. William C. McLaughlin, for several years draughtsman and pattern maker in the department, has been appointed to fill the vacancy.

* * *

The filing of a corporation return at the office of the city clerk of Pawtucket shows that the paid-in capital of the Phillips Insulated Wire Co. has been increased to $2,500,000, the full amount allowed by the charter amended at the January session of the General Assembly of the present year. The return is signed by the following: Henry F. Bassett, president; Herbert O. Phillips, treasurer; Edgar B. Phillips, secretary; Henry F. Bassett, Herbert O. Phillips and Charles F. Price, directors.

* * *

A third dividend of 16⅔ per cent has been ordered paid to the creditors of the Consumers' Rubber Co., of Bristol, by the referee in bankruptcy, Nathan W. Littlefield. This makes a total of 56⅔ per cent that has been allowed so far, the last dividend now being payable by the trustee, Robert S. Emerson, of this city.

* * *

The Bourn Rubber Co., Westfield street, Providence, reports an especially busy year so far, and at present is being driven to capacity in nearly all departments. This is particularly true of the insulated wire department, and during the past month several additions have been made to the working force of that section.

* * *

The Narragansett Rubber Co., of Bristol, is adding to its plant. A new two-story wooden building, 88 feet in length and 50 feet in width, is practically completed, the lower floor of which is to be used as a calendering room.

* * *

Albert Lodlum, who has held a prominent position with the Revere Rubber Co. for several years, has resigned. Before leaving, his associates presented to him a gold watch chain and fountain pen.

* * *

During the past month the assessors of taxes in the various towns and cities throughout the State have been filing their annual assessment lists. Among the larger taxpayers are the following who are identified with the rubber industry, in addition to those previously reported: At Cranston—Atlantic Tubing Co., $22,415; William B. Banigan Estate, $34,160; Emma T. O'Connor, executor of William B. Banigan's will, $97,600.

At Pawtucket—Collyer Insulated Wire Co., $67,420; Everlastik, Inc., $187,020; Hope Webbing Co., $828,860; Phillips Insulated Wire Co., $664,980; Tubular Woven Fabric Co., $34,180.

* * *

The International Rubber Co., which is being operated several hours each evening, in addition to a full-time day schedule, turning out carriage cloth at West Barrington, experienced a shortage of white cloth which necessitated a shutdown for a couple of days.

* * *

Henry L. Scott & Co., formerly of 223 Eddy street, Providence, have removed their offices and factory to their new building, Blackstone and Culver streets. The new factory has been equipped with the latest machinery and appliances and a cordial invitation is extended to the trade to visit the plant and inspect late models. This company specializes in the manufacture of machines for the testing of rubber and fabrics used in the production of rubber merchandise.

* * *

While overhauling the Millville plant of the Woonsocket Rubber Co. recently, the workmen found the cylinder head on the engine so badly cracked as to preclude any possibility of using without repairs. It was necessary to shut down the plant for several days while the work was being done.

* * *

James Leach, for over 21 years employed by the Mechanical Multiple Fabric Co., the last 19 years as foreman of the spreading department, has resigned to accept a similar position with the Firestone Tire & Rubber Co., of Akron, Ohio. His local associates presented to him a gold watch chain and charm and a substantial leather suitcase, Superintendent Lloyd, of the Fabric company making the presentation speech.

RUBBER CLUB BANQUET ANNOUNCEMENTS.

INTEREST in the coming banquet of The Rubber Club of America, Inc., to be held in New York City January 8, will be heightened by the announcement that two of the speakers on that occasion will be Hon. William H. Taft, Ex-President of the United States, and F. A. Vanderlip, president of the National City Bank of New York, both of whom will speak on important national matters of direct interest to the rubber trade. Committees are being appointed to promote interest in this meeting. The following have already been chosen, and are at work in their various sections:

CANADIAN COMMITTEE. Charles N. Candee (chairman), Gutta Percha & Rubber, Limited, Toronto; T. H. Rieder, Canadian Consolidated Rubber Co., Limited, Montreal; J. Westren, Dunlop Tire & Rubber Co., Toronto.

BOSTON COMMITTEE. Hon. L. D. Apsley, Apsley Rubber Co., Hudson; Frederick H. Jones, Tyer Rubber Co., Andover; Harold P. Fuller, E. H. Clapp Rubber Co.

AKRON COMMITTEE. H. S. Firestone, Firestone Tire & Rubber Co., chairman.

TRENTON COMMITTEE. J. A. Lambert, Acme Rubber Manufacturing Co., chairman.

A NEW RUBBER ASSOCIATION.

Efforts are being made in London to form a new rubber association which would devote special attention to British interests in the rubber industry in Java and Sumatra, which are very extensive.

It is said that the Rubber Growers' Association was approached with a view to the formation of a separate branch under its auspices, but as such arrangement could not be made, it is proposed to proceed independently. In fact, in certain respects the problems plantation companies have to deal with in the Dutch East Indies are quite different from those of the Malay and Indian companies.

The India Rubber Trade in Great Britain.

By a Special Correspondent.

FROM information received from different sections of the country it appears that the volume of general trade continues to be good, but pneumatic tire manufacturers report a slack business. There is a constant turnover, but it is stated that the restrictions on the use of petrol, or gasolene, as you call it, have, in fact, seriously affected the tire trade. A great number of automobiles are laid up in garages; even commercial cars in some cases have been idle for months, largely owing to the prohibitive price of gasolene.

RUBBER HELPS SOLVE GASOLENE SHORTAGE.

Many owners of commercial automobiles are now using city gas instead of gasolene as a fuel for their motors.

The use of gas as a fuel for automobile gasolene engines is not new, for town gas has long been used by manufacturers for the preliminary testing of their engines, though it will not give the power of gasolene.

The problem was to conveniently carry this city gas on vehicles. At first it was attempted to store it in metal tanks, under

MOTOR BUS WITH RUBBER-LINED GAS CONTAINER.

pressure, but these were found far too heavy for practical use on motor trucks and, after many tests and experiments, the accepted container now is a double texture canvas bag with rubber insertion, rendering it water and gas tight. This is roped or strapped to the roof of the vehicle and is filled from the gas supply mains. Far from increasing the weight of the vehicle, this rubber-lined gas-bag rather has a tendency to lighten the load on the springs.

SOLID TIRE BUSINESS GOOD.

While business is slack and competition very keen in the pneumatic tire trade, the solid tire industry is working night and day and there is unlimited faith here in this branch of the rubber industry.

MECHANICAL RUBBER GOODS.

Manufacturers of mechanical rubber goods are doing very brisk business and there is no sign of slackness in this line in the near future.

Rubber toy and novelty manufacturers also report excellent orders.

The demand for rubber soles and heels is increasing every day and large manufacturers in this line are well employed. Some small ones, however, are said to be experiencing a trying time, due to the fact that the withdrawal of labor from small works is usually more seriously felt than similar withdrawal from large factories.

RECLAIMING INDUSTRY.

Rubber reclaimers continue to suffer from the labor difficulties mentioned in a former communication, but they are nevertheless doing a roaring business and have trouble in promptly meeting orders.

WATERPROOF GARMENTS, ETC.

The waterproof garment people are working full time and overtime. They have received large government orders for garments for the soldiers, who are sure to pass another winter in the trenches, and the wet weather we have been experiencing has made a great demand for waterproof garments, both rubberized and chemically treated.

Cable and insulated wire manufacturers have all the work they can handle.

Demands for all kinds of surgical rubber and other hospital appliances are increasing daily.

TIRE MANUFACTURERS' ASSOCIATION.

The British Rubber Tyre Manufacturers' Association, Limited, is the name of an organization recently formed "to watch over, protect and advance" the interests of British tire manufacturers.

To qualify for membership, a tire manufacturer must have his principal works in the United Kingdom and his tire sales must be to the extent of at least 90 per cent manufactured in Great Britain. Companies whose capital is to the extent of 25 per cent or more held, directly or indirectly, by individuals resident outside the limits of the British Empire, will be barred from membership.

Dealers in rubber tires may become members of this association provided the sale of tires is their principal business though, even then, their admission to membership is discretionary with the general committee of the association. Rubber manufacturers whose works are situated in any British colony, dependency, or self-governed dominion are also eligible for membership at the discretion of the general committee.

RUBBER MACHINERY NEEDED IN CHINA.

From a recent report of our Board of Trade, it appears that machinery will be required in the near future for the rubber plantations in the island of Hainan, China.

The Board of Trade tells us that there is an American merchant at Kiung-chau, Hainan, China, and under existing conditions it is probable that an American manufacturer will get the business.

RUBBER EXPORTS TO HOLLAND.

The Foreign Office has issued notification that no additional export licenses or other facilities will be given for the export from England of rubber and balata to Holland or Sweden until further notice.

CHANGES IN EMBARGO LIST.

The Royal Proclamation of May 10, giving a list of prohibited exports, has been amended. The heading, "Goods wholly or partly of rubber, gutta percha or balata," has been deleted from the list of prohibition to all destinations, but has been added to the list of prohibition of exportation to all non-British destinations.

NEW RUBBER IMPORTING COMPANY.

Ernest Gray & Co., Limited, was registered recently with a capital of £1,000, in £1 shares, to carry on a general import business in dentists' supplies, including dental rubbers and other articles composed of rubber, porcelain or similar substances. This new company's address is Cul-de-Sac Road, East Molesey, England.

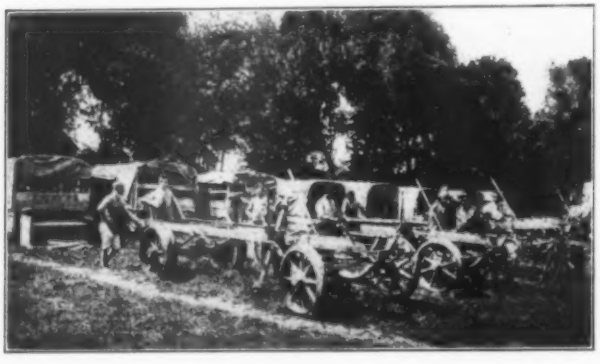
THE SITUATION IN FRANCE.

By our Regular Correspondent.

SINCE my last communication I have had the opportunity of visiting Clermont-Ferrand, the center of our rubber industry, the Akron of France. I had not been there since the outbreak of the war and I assure you that the changes brought about by the present conditions are much more visible there than here in Paris.

Your readers are familiar with the important role rubber tires are playing in this war; they also know that the tire industry has always been the chief rubber industry in France, and that—since we settled down and organized for war conditions—our tire manufacturers have been able to supply practically all the needs of our armies and to do much for our Allies. But what your readers probably do not know is that our rubber manufacturers have adapted their manufacturing facilities to the production of many articles that are only remotely or not at all related to rubber.

All the factories in Clermont-Ferrand are under military control; army officers, army engineers, and men in uniform have charge of everything and are doing all the work that cannot be



ARMY TRUCKS AT MILITARY REPAIR STATION.

trusted to women. I found Michelin and Bergougnan making aeroplanes; not only the rubberized fabrics for covering the wings of flying machines, but whole machines, even motors. They are doing this besides producing more tires than they ever did in peace times, and they are also turning out shells, cannon parts, artillery wheels, fuses, cartridges, and all sorts of metal and rubber sundries. Their valve departments, rim and wheel shops were found to be well suited, both as regards workmen and machinery, for producing a score of articles they never before dreamed of turning out. In one plant I saw 50 huge aeroplanes in course of completion, and practically all the men working on them had been rubber workers, mechanics, carpenters and die-makers in rubber factories prior to the war. This was a revelation to me. I had no idea of such developments in our rubber industry. I had read in THE INDIA RUBBER WORLD about the adaptability shown by the German rubber industry, but did not suspect that ours had equaled it in this direction. But they have perhaps gone still further. Clermont-Ferrand rubber workers are making all sorts of things that were unknown to them a year ago and they are doing it as though they had never done anything else. The organization is perfect.

ORGANIZATION.

Speaking of organization, never, in any circumstances, have French manufacturers shown greater activity, more ardent desire to complete and improve, in the economic battle-field, the victory France will owe to her incomparable soldiers.

Old organizations are rivaling in zeal and effort in the work of necessary preparation for securing new outlets for the products of the national industries, including the manufacture of rubber. New organizations are being constituted. Special publications are coming into being. All are working for the commercial and industrial future of our country.

Writers, who formerly devoted their time and talents exclusively to literature, are now placing their pens in the service of the work that is necessary to the France of tomorrow. All consider it a duty to complete the work of our brilliant armies. France is organizing for future economic battles, and the ardor and the excellent intentions of our people will result in positive achievements. We recognize that one of our greatest faults was lack of organization, and we have been working to correct it. Our army officers have taught much to our business men. They have shown what great things can be accomplished smoothly, with proper organization. Our army motor transport service is a model of organization. Take the rubber tire departments, for instance:

TIRE DEPOTS.

The quantities of tires consumed by thousands of vehicles under war conditions is difficult to imagine; it cannot be mentally grasped by mere multiplication of numbers. I recently visited a tire depot. I saw thousands and thousands of permanent-band solid rubber tires. Tier upon tier, pile upon pile, huge ribbed pillars; a veritable forest of them. In and out they were being rolled like huge hoops. As fast as they go out, they are replaced by new arrivals.

The pneumatic tire storage warehouses have racks built from end to end, and these racks, of great height, are filled with tires that stand upright, side by side, making walls of rubber. The multiplication of all makes and sizes is handled with system and precision.

The system is wonderful. In tire casualities, which, naturally, are very numerous, the tire and tube is quickly inspected by a staff of experts and a report sent back to the unit from which it came. When the tires are repairable, they are sorted out into two lots—one lot repairable at the depot is at once sent to the local tire repair shops, and the other lot, representing the almost unrepairable, is sent to the factory.

Useless tires are sent to a special department which attends to their disposal as rubber waste. Nothing is too small to be conserved, and waste is reduced to a minimum.

PLANTATION RUBBER IN COCHIN CHINA.

The series of articles being published in THE INDIA RUBBER WORLD on "Plantation Rubber in Cochin China," is the subject of great satisfaction in our rubber circles.

Most of our rubber manufacturers have large investments in these plantations, many of which are already paying propositions.

FRENCH IMPORT OFFICE IN LONDON.

Our government has opened a special office in London for the granting of licenses for the importation into France and Algeria of goods coming through London and under import prohibition in those territories.

PERSONALS.

Emil Desmidt and Eugene Roux, rubber planters in Cochin China, lost their lives during the recent fighting in the Argonne section of the Western battle front.

IMPORTANT HYDRO-ELECTRIC PROJECTS IN FRANCE.

The American Consul at Grenoble, France, reports that interest in hydro-electric development has been recently revived by the Chamber of Commerce of Grenoble to attract new industries to that part of France. Contemplated installations will use the energy furnished by the water courses of the Alps to reach an aggregate mean production of about 265,000 horse-power, and will require large quantities of insulated wire and cables, as well as other electrical apparatus.

RUBBER TIRES IN NORWAY.

By Our Regular Correspondent.

THE prosperity now prevailing in Norway is reflected in the increased use of motor vehicles, both pleasure and business. By far the larger number of automobiles imported come from the United States, but large consignments are also received from Italy. All these are imported without tires.

Under an arrangement with the British authorities, all rubber tires are imported into Norway through London and consigned only to the Royal Automobile Club, Christiania. The club distributes the tires to the dealers, who are obliged to give guaranties that they are to be used only in Norway. The greatly increased demand for automobiles has made it difficult to obtain rubber tires sufficient to supply the requirements of the trade.

Last October, as was reported in THE INDIA RUBBER WORLD, the automobile club succeeded in obtaining permission to import 9,000 automobile tires, 4,800 motor tubes and 800 motorcycle tires during the current year. At that time the quantity was deemed sufficient for the needs of the country. The prosperous times, however, have upset all calculations. While on January 1, 1916, there were registered in Norway only 1,520 automobiles, the number has now increased to 2,084, and it has become apparent that the automobile supplies for which licenses had been obtained will not last through the year. The secretary of the automobile club recently went to London to confer with the authorities there on the subject, and has succeeded now in securing an extension of the limit on tires and tubes for automobiles and motorcycles.

The distribution of the tires will be handled jointly by the Royal Automobile Club of Norway and the Rubber Importers Association, organized under the auspices of the club. For every new tire delivered a worn-out one must be turned in to the club.

SOME FOREIGN RUBBER NOTES.

TIRES IN SCANDINAVIAN COUNTRIES.

THE tire famine in Scandinavian countries continues acute, especially in Norway and Sweden.

In the early months of the war and during the year 1915 many tires were smuggled from Scandinavia into Germany, and now Great Britain, which holds the key to the tire situation in Europe, is applying most stringent measures in controlling the supply to European neutrals, allowing but small consignments, and these at infrequent times.

The result of this is that a set of average-sized tires to-day in Sweden costs the price of a Ford car in the United States. In Stockholm 34x4 tire casings sell for the equivalent of $150 in United States gold, and $25 is a current price for inner tubes of the same size.

SWISS TRADE IN RUBBER GOODS.

Imports of rubber and rubber goods into Switzerland during the year 1915 amounted to $1,624,026, against $1,562,425 during 1914. Export of similar articles amounted to $512,428 and $335,266 during the years 1915 and 1914, respectively.

Reëxportation of raw and manufactured rubber is only allowed to those countries from which or through which the articles or raw materials have been imported and into countries that are allies of these.

The Contraband Department of the British Foreign Office has caused publication of a list of articles in respect of which licenses for export to Switzerland are only granted if the goods are consigned to the S. S. S. (Société Suisse de Surveillance Economique). Among the articles listed are: All forms of rubber, balata, gutta percha, raw or *re-melted (sic)*, including waste and ebonite; rubber wares; rubber-proofed and rubber-mixed goods.

Erasers, toys, drains, gloves, injectors, dental rubber and mixed rubber wares, partly rubber, can be sent under what is known as the small parcel scheme; that is to say, they may be exported from Great Britain to Switzerland without an acceptance certificate from the S. S. S. But this does not prejudice the right of the War Trade Department to insist on the production of a certificate from the S. S. S., where this is considered desirable. All parcels must be consigned to the S. S. S. for account of the ultimate consignee, via the International Postal Parcels Bureau, Pontarlier, France.

PORTUGUESE EMBARGO ON RUBBER.

On August 14 the Portuguese Government issued a decree declaring certain merchandise contraband of war. On a schedule of these contraband goods appear rubber, gutta percha, and similar substances, including these commodities in the crude state, reclaimed, or as waste, solutions, cements, and goods made partly or wholly thereof.

RUBBER IN HERRING BARRELS.

An English contemporary states that a German merchant, representing a German rubber factory, and three other persons, were sentenced at Copenhagen, Denmark, recently, to 120 days' imprisonment, each, and, in addition, fines, amounting to 350,000 kronen [$91,000], were imposed for smuggling raw rubber from Denmark into Germany concealed in salt herring barrels.

JAPAN'S IMPORTS OF CRUDE RUBBER.

According to the official trade returns of Japan, the total value of crude rubber and gutta percha imported during the first six months of 1916 amounted to 3,626,000 yen [average value of yen for this period, .5075 cents] against 1,560,000 yen during the corresponding period of 1915, more than 220 per cent.

RUBBER BRINGS PROSPERITY TO SHANGHAI.

The American Consul General at Shanghai, China, reports that local investments in rubber plantations in Malaya appreciated largely in value during the year 1915 and brought much ready money into the hands of investors; the large sums invested in 1910, the year of the rubber boom, were to a certain extent recovered. The appreciation of rubber investments had a beneficial influence on retail trade, as investors who made large profits were more inclined to buy luxuries.

MULTIPLE FACTORY SYSTEM ON RUBBER PLANTATIONS.

It has for some time been the tendency on Far Eastern rubber plantations to build one or two very large buildings and there centralize the work of curing the output of the estate.

The Mooply Valley Rubber Co., Limited (Ceylon), has departed from this practice and is completing six factories—one on each division of its estates. Five of these factories will turn out high-grade crude rubber, each serving 800 to 1,000 acres, and one factory will deal entirely with scrap. Because the transport of latex will be materially less, it is considered that this multiple factory system will give as good results from an economical point of view as where one large factory is used. Other advantages will be five managers competing with each other in trying to turn out the best rubber possible, each man having the responsibility of growing, cultivating and turning out the finished crude rubber. Thus there will be interest and emulation that can hardly be expected under present conditions. Smaller individual plants will make for closer supervision and thus facilitate the production of quality as well as quantity. Another definite advantage of this system of one factory for each division is that if a breakdown or a fire occurs in any factory, there will be no great trouble in handling the latex in the other plants of the same estate.

Rubber Planting Notes.

MALAYAN PLANTERS FEAR AMERICAN INVASION.

SOME anxiety appears to exist in Malaya concerning what is termed the "American Invasion."

It is asserted that representatives of American rubber interests are seeking land grants in the Federated Malay States and the planters fear that, should the local government grant any large area to these interests, such action might add to the present difficulties of the labor question in Malaya.

Rubber estates import most of their coolies under contract and have difficulty in preventing them from breaking their agreements and going to work for native land owners. The fear is that there would be created a fresh demand for labor if large areas were to be opened up at one time.

Besides this question of shortage of labor, there is, of course, the question of wages, which the planters do not wish to see higher than the present level.

Our Malayan contemporary, "Grenier's Rubber News," suggests that a good way to obviate the danger would be to make all grants of land conditional on the Americans importing all the labor necessary, and perhaps more, for the new plantations. In other words, guarantees should be secured from American interests to safeguard the labor in the Federated Malay States from a partial or wholesale absorption by the "invaders," whose motive spirit does not appear to be questioned, our contemporary explaining: "An area of 100,000 acres opened up next year will yield probably in 1921 only about 13,000 tons of rubber, and in that year of grace the American requirements of the commodity will be more than 15 times that quantity, and Britain will still hold a great preponderance of power."

DISEASES OF PLANTATION HEVEA IN CEYLON.

From the annual report of the botanist and mycologist of the Ceylon Agricultural Society, it appears that during the year 1915 this society received 44 consignments of *Hevea Brasiliensis* disease specimens for examination.

The specimens of *Hevea* sent in for report showed that in prevalence the diseases occupy the same relative position as in former years, and, taken altogether, there appeared to be a general diminution of disease.

The "canker" fungus, *Phytophthora Faberi*, again heads the list. Pod disease caused by this fungus was severe in some districts in July; this was accompanied by heavy leaf-fall, owing to the spread of the fungus to the leaf stalks. This condition has recently been reported from South India.

Canker of the leaf stem in its early stages has been effectively treated by light scraping and treatment with 20 per cent solution of carbolineum in water.

Canker at the collar of trees was found in the Matara district, where it had nearly ringed several trees. By early and vigorous treatment it is deemed possible to lessen, to a considerable extent, the ravages of this fungus.

Towards the end of the year *Fomes lignosus* (same as *Fomes semitostus*) was reported on several occasions from the Kelani Valley. Drastic removal and burning of diseased roots and jungle stumps where these still occur in rubber clearings is recommended to reduce the losses from this cause.

Decay of the renewing cortex or "bark rot," as it is more generally termed, was somewhat prevalent about July and November, during wet weather experienced in those months. In December experimental work was initiated in connection with this disease. Inoculations of the freshly tapped surface of healthy trees with diseased bark yielded no cases of infection. Treatment with 20 per cent water solution of carbolineum appeared to mitigate the severity of fresh attacks, but had no immediately apparent effect in arresting the rot of bark already affected.

This disease would appear to be capable of explanation on purely physiological grounds.

Treatment of diseased areas with clay and cowdung mixtures is being tried as a means of accelerating the process of occlusion of exposed wood surfaces.

One case of *Poria hypolateritia* killing young *Hevea* was observed on the Experiment Station at Ganoruwa.

A case of *Colletotrichum ficus* was recorded on *Hevea* leaves.

The rubber research chemist of the Ceylon Agricultural Society started an investigation into the formation of latex cells in conjunction with the botanist and mycologist in August, 1915. This research will cover a period of at least one year in order to allow of observations being made in various seasons of the year.

Observations made on samples of bark from numerous trees indicate that the number of rows of latex cells varies to a considerable extent, according to the height from the ground.

INSECT PESTS OF HEVEA IN CEYLON.

In a recent number of "The Tropical Agriculturist," the Assistant Entomologist of the Department of Agriculture of Ceylon states that *Hevea* rubber on Ceylon plantations appears to maintain almost complete immunity from insect ravages. Such pests as have been reported during the past year were either scarcely pests at all or confined their attacks to sickly or diseased trees. No reason can be assigned for this, other than the one put forward by Mr. Green some years ago,—that the latex acts as a strong deterrent against any attempt to penetrate the bark. The following pests were reported during the fiscal year 1915-1916:

Mariælla dussumieri, the rubber slug, was reported as drinking latex, in Udugama in March.

Scolytidæ, boring beetles, were reported several times but, on investigation, it appeared that the borers attack only unsound bark, and are probably attracted by the fungi which grow in it and not by the bark or the wood.

Lecanium nigrum, the black scale insect, was reported from various districts in August and October, but in each case it appeared to do little harm.

Batocera rubus, root and stem borer, was reported from Pelmadulla in November, when it was taken from the stem of a rubber tree which had fallen down through the damage done by the grub.

THINNING OUT RUBBER.

Our Ceylon contemporary, the "Tropical Agriculturist," publishes the following table, showing the result of thinning out rubber on a plantation 20 years old:

FIFTEEN ACRES OLD RUBBER.

Season.	Crop.	Yield Per Acre.	Trees.	Trees Per Acre.	Rainfall.
1907-08	4,003	267	2,419	161	145.41
1908-09	4,020	268	2,419	161	168.49
1909-10	5,146	343	2,419	161	137.65
1910-11	6,594	439	2,419	161	142.64
1911-12	6,425	428	2,419	161	167.02
1912-13	6,532	435	2,419	161	161.41
1913-14	6,001	400	2,180	145	196.84
1914-15	6,596	439	1,604	106	134.97

These figures show that profitable results follow the thinning out of a plantation, even of this age; at least, under certain conditions. There are no data for laying down definite conclusions on this subject. It depends upon so many factors: the original spacing, climate and price of rubber.

The Committee of Agricultural Experiments of the Ceylon

Agricultural Society holds that thinning out should not be delayed too long, but should be done early enough to allow the trees ample opportunity to branch.

The Experiment Station of the Ceylon Agricultural Society is cutting out two small plots of *Castilloa* rubber, having decided that the space could be more usefully planted with other products. A few specimen trees will, however, be retained.

PLANTERS IN ARMY SERVICE.

The "Malay Mail" of Kuala Lumpur, Federated Malay States, as a supplement to its August 4 issue, publishes a "Roll of Honor" containing a list of names of present or past residents of the Malay States under British protection, who have lost their lives in the present war. This is followed by a list of such residents who have been, or shortly will be serving in the British army. It will be noted that by far the majority of the names on both lists are those of planters, or men in some way connected with the planting industry.

PROHIBITED EXPORTS FROM INDIA.

A notification issued by the Department of Commerce and Industry of India contains a revised list of articles, the exportation of which is at present prohibited from British India. Among these articles appears rubber, raw and manufactured, which cannot be exported to any destination except the United Kingdom, France, Russia (except the Baltic ports), and British possessions or protectorates.

BARK ROT OF *HEVEA* IN BURMA.

THE Department of Agriculture of British Burma has published a most interesting bulletin on "Black Thread Disease of *Hevea* in Burma," by I. F. Dastur, First Assistant Imperial Mycologist at Pusa, Burma.

The "black thread disease" is what is commonly known in Ceylon as "bark rot," and has received repeated mention in THE INDIA RUBBER WORLD.

The naked tissues laid bare by tapping become disfigured and damaged by the appearance of vertical, slightly depressed black lines. These follow the tapping cut as it is continued down the trunk of the tree and extend through the cambium into the wood. The blackening of the tissues runs along the tapped area and eventually covers the whole cut. Diseased areas soon become vertically cracked, especially in wet weather. From the vertical cracks latex occasionally exudes. In some cases there is a thick wad of coagulated latex between the diseased renewing bark and the wood; in these cases the cambium is completely destroyed and there is always a bulging out of the diseased renewing bark. This soon decays, leaving behind a gaping wound, exposing the wood. A true "canker" is thus formed. It is the damage to the cambium which constitutes the most serious feature of the disease, for it is upon the activity of this tissue that the tree depends for the smooth and even regeneration of the bark cut away during tapping.

Careful inoculation experiments conducted by Mr. Dastur, with pure cultures, have proved that this disease is caused by the same fungus, a species of *Phytopthora*, which attacks fruits and causes them to rot, and to which certain experts have attributed the cause of abnormal leaf-fall. Inoculation experiments on tapping cuts, renewing bark and old bark showed that the fungus was capable of attacking the tree only through wounds. Inoculations made on uninjured parts of the stem and branches invariably failed, while those on the wounded surface were successful.

The disease first makes its appearance soon after the rains set in, and completely disappears after the close of the wet season. Even during the monsoon, the progress of the disease is checked during a long break. The annual recurrence of the disease on the stem has not been found to originate from the infected areas of the previous year, but has been observed to be due to fresh infection. On an infected area the disease spreads downward, following the tapping cut; if tapping is stopped the spreading of the disease is stopped. This is what would be expected from the discovery that the trouble is caused by a parasitic fungus. The fungus, however, lies dormant when tapping is stopped during the monsoon, and resumes its activity when tapping is recommenced any time during the rainy period.

The fungus spreads most rapidly in wet weather, and it is pointed out that closely planted trees, which create a dark, moist atmosphere, favor the disease. This leads the author to suggest that one of the best methods of control is to thin out the trees so as to let in more light and air. The application of fungicides, like Burgundy Mixture, was a failure, though a 20 per cent solution of carbolinium is said to have been a success in Java. Cessation of tapping at the first appearance of the disease, and collection and destruction of all diseased fruits, are recommended by the author as practical means of control. The latter is, however, a difficult procedure in rubber estate practice and requires much labor.

Commenting on this report, the "Planters' Chronicle" says that in South India it has been found that a combination of cessation of tapping on attacked trees, with the application of a thin smear of a mixture of tar and tallow applied to the diseased spot, has proved very effective. The mixture is applied with the finger and then rubbed with a small piece of gunny cloth, so as to confine the smear to the bark area attacked. Its action appears to be twofold. The tar acts as an antiseptic, while the tallow forms a waterproof covering, and thus deprives the fungus of the moisture so necessary for its growth and welfare. After the monsoon, the treated areas gradually shed a thin scale of tar-coated bark and expose a clean, healthy surface beneath.

Covering the tapped surface with a mixture of cowdung, clay and sulphur has also been found beneficial; the bark renews quickly and well enough beneath this covering, and the bark rot is reduced. The mixture may be best made by boiling one ounce of sulphur in half a kerosene tin of water and adding equal parts of clay and cowdung till a thick paste is obtained. The addition of a pinch of salt tends to keep the mixture moist and to prevent it from cracking, after application. This mixture is chiefly applied in the dry weather. It prevents the tapped area drying out and promotes good bark renewal. It appears also to have a beneficial effect, as far as bark rot is concerned, when the rains begin. In Ceylon the mixture is applied each month, within a quarter of an inch of the tapping cut, but in South India it is usually applied over the tapped area when tapping ceases, as it does in some districts, on account of the dry weather.

It is interesting to note that the mycologist in Burma has been successful in inoculating healthy trees with the disease, whereas, in Ceylon, experiments undertaken by the Ceylon Committee of Agricultural Experiments did not show the same result. Working on this disease in Ceylon, Mr. Bryce was inclined to attribute it to a physiological effect, and not to fungus disease at all. Mr. Bryce failed in his attempts to inoculate trees with the disease, and his theory was, apparently, that in wet weather the formation of the cork layer which protects the cells of the inner tissue, and of the wood cambium, was delayed. This causes cells to die locally, and the decomposition products thus set free infiltrate into the neighboring cells and kill them. It may be that the black thread disease in Burma is different in nature from the "bark rot" disease of Ceylon plantation *Hevea;* however, Mr. Dastur is to be congratulated for having definitely proved this disease in Burma to be due to the presence of a fungus, as the first real step towards the control of plant disease is to discover to what it is due.

THE ISLAND OF HAINAN, CHINA, WILL SOON NEED RUBBER machinery in order to bring its plantation product up to the standard qualities in the Singapore market.

Recent Patents Relating to Rubber.

THE UNITED STATES.

ISSUED SEPTEMBER 19, 1916.

NO. 1,198,447. Tire with a pneumatic tube comprising a series of bellows-like cells. J. A. Horigan, Kansas City, Mo.

1,198,548. Attachment for auto-tires. A. G. Holen, Northfield, Mass.

1,198,552. Automobile emergency tread. G. D. Hutchinson, Pavilion, N. Y.

1,198,634. Pneumatic tire with armored tube. C. P. Hensley, San Francisco, Calif.

1,198,687. Inflatable mattress, pillow, cushion, and upholstery. H. I. Williams, Barberton, and E. L. Bechtel, Akron—both in Ohio.

1,198,688. Collapsed-tire alarm. G. F. Young, Indianapolis, Ind.

1,198,742. Self-retaining rectal tube. C. W. Meinecke, East Orange, N. J., assignor to Meinecke & Co., New York City.

1,198,747. Tire casing with inner springs. B. C. Mudge, North Brookfield, Mass.

1,198,812. Armored pneumatic tire. A. Baigne, assignor of one-half to Anna Brie—both of Montreal, Quebec, Canada.

1,198,927. Horseshoe pad. E. Kempshall, Washington, D. C.

1,198,947. Orthopedic device consisting of a tubular soft rubber cushion for the great toe. A. L. Murphy, New York City.

1,198,950. Self-filling fountain pen. J. H. Palmer, Jersey City, N. J.

1,199,003. Closure for hot water bottles. O. M. Gottesman, New York City.

1,199,025. Nursing bottle and nipple. W. B. Worlock, Rome, assignor of one-half to C. E. Kelley, Buffalo—both in New York.

1,199,037. Elastic for suspenders. W. C. Holiday, Wekiwa, Fla.

ISSUED SEPTEMBER 26, 1916.

1,199,078. Garment supporter loop comprising an elastic pad. G. I. Jeralds, Cheshire, Conn.

1,199,144. Rubber tissue in making wigs. Zan Zax, Los Angeles, Calif.

1,199,236. Puttee or spat having a main portion of elastic material. J. Boyd, Clonbur, Galway, Ireland.

1,199,264. Pneumatic tire. H. E. Grabau, Long Island City, N. Y.

1,199,456. Rubber brush for bottle cleaning machines. O. Eick, St. Louis, Mo.

1,199,509. Wind shield cleaner with a rubber strip. W. F. Tesnow, Chicago, Ill.

1,199,562. Tire protector. C. Jordan, Pittsburgh, Pa.

1,199,644. Inner tube ends mechanically joined within the casing. C. S. Wert, Kendallville, Ind.

1,199,660. Demountable rim. C. Braniff, Cincinnati, Ohio.

1,199,670. Massage apparatus for attachment to a sewing machine. B. L. Davis, Detroit, Mich.

1,199,686. Tire clamp. H. J. Geake, Victoria, British Columbia, Canada.

1,199,698. Antiskid-chain. A. J. Heinsius, Charleroi borough, assignor of one-half to C. C. Dieter, Pittsburgh—both in Pennsylvania.

1,199,702. Combination inflatable life saving and swimming device. G. W. Johnston, St. Joseph, Mo.

1,199,717. Tire filler. D. H. Shapiro, Montreal, Quebec, Canada.

ISSUED OCTOBER 3, 1916.

1,199,789. Electrical conductor. M. Hochstadter, Harrisburg, Pa.

1,199,817. Rubber heel. E. T. Packard, Avon, Mass.

1,199,826. Hose clamp. A. F. Schroeder, Cleveland, Ohio.

1,199,837. Shaving brush. C. E. Thompson, assignor of one-half to F. H. Wager—both of Troy, N. Y.

1,199,859. Rim for metallic vehicle wheel. E. K. Baker, assignor to Universal Rim Co.—both of Chicago, Ill.

1,199,892. Pneumatic tire. E. H. Herrick, New York City.

1,199,902. Rubber heel in which is embedded a coiled spring. E. Kempshall, Washington, D. C.

1,199,914. Leg warming boot comprising an inner waterproof stocking. W. O. Mossor, assignor of one-half to P. S. Williams—both of Looneyville, W. Va.

1,199,993. Fountain pen with a collapsible ink sack. G. M. Kraker, assignor to Kraker Pen Co.—both of Kansas City, Mo.

1,200,015. Bead, etc. M. Paridon, assignor of one-half to H. A. Rudd—both of Barberton, Ohio.

1,200,031. Pneumatic tire shoe. H. A. Rudd, assignor of one-half to M. Paridon—both of Barberton, Ohio.

1,200,237. Emergency tire. V. E. Reichard, Perry, N. Y.

1,200,255. Auxiliary metal tire for wheels. W. A. Steele, Los Angeles, Calif.

1,200,291. Cushion tire comprising a metal shoe and rubber tube. C. F. Adams, Pavo, Ga.

1,200,355. Tire protector. J. O. Howard, Austin, Texas.

1,200,358. Tire valve. C. A. Iorns, St. Louis, Mo.

1,200,418. Self-inflating tire. J. Fernandez, Brownsville, Texas.

ISSUED OCTOBER 10, 1916.

1,200,566. Demountable tire. R. Wright, assignor of one-half to F. J. Bommer, Jr.—both of Cleveland, Ohio.

1,200,596. Rubber tooth brush which slips over the finger. J. A. Daly, New Rochelle, N. Y.

1,200,602. Bottle cleaner. J. Freud, assignor to E. Schwarz—both of Chicago, Ill.

1,200,616. Life-saving device. R. W. Hudson and H. B. Spencer, assignors of one-fourth to R. W. Nichols—all of Ottawa, Ontario, Canada, and one-fourth to A. E. Hudson, Calgary, Alberta, Canada.

1,200,623. Tire valve. H. P. Kraft, Ridgewood, N. J.

1,200,671. Tire protecter. L. L. Warr, Malden, Mass.

1,200,779. Platen for typewriting machine. W. A. Thompson, Belleville, Ill.

1,200,807. Antiskidding tire protector. A. L. Burdt and J. Taylor, Chardon, Ohio, assignors of three-fourths to said Burtt and one-fourth to said Taylor.

1,200,874. Combination of a tire and an inflating pump connected directly thereto. G. E. R. Rothenbucher, New York City.

1,200,933. Inflatable life-saving and swimming belt. I. Fraki and W. A. Merila, Hancock, Mich.

1,201,045. Closure device for toy balloons. R. Head, New York City, assignor to Howe Baumann Balloon Co., Newark, N. J.

1,201,089. Demountable rim. H. J. Parker and J. R. Bradford, San Francisco, assignors of one-half to L. P. Woodbury, Berkeley—both in California.

1,201,117. Vehicle wheel rim. J. H. Wagenhorst, assignor of one-fifth to the Goodyear Tire & Rubber Co.—both of Akron, Ohio; two-fifths to The B. F. Goodrich Co., and one-fifth to the United States Tire Co.—both of New York City.

1,201,118. Vehicle wheel rim. J. H. Wagenhorst, assignor of one-fifth to the Goodyear Tire & Rubber Co.—both of Akron, Ohio; two-fifths to The B. F. Goodrich Co., and one-fifth to the United States Tire Co.—both of New York City.

1,201,119. Vehicle wheel rim. J. H. Wagenhorst, assignor of one-fifth to the Goodyear Tire & Rubber Co.—both of Akron, Ohio; two-fifths to The B. F. Goodrich Co., and one-fifth to the United States Tire Co.—both of New York City.

1,201,120. Vehicle wheel and rim therefor. J. H. Wagenhorst, assignor of one-fifth to the Goodyear Tire & Rubber Co.—both of Akron, Ohio; two-fifths to The B. F. Goodrich Co., one-fifth to the United States Tire Co.—both of New York City, and one-fifth to the United Rim Co., a corporation of Ohio.

1,201,121. Vehicle wheel rim. James H. Wagenhorst, assignor of one-fifth to the Goodyear Tire & Rubber Co.—both of Akron, Ohio; two-fifths to The B. F. Goodrich Co., one-fifth to the United States Tire Co.—both of New York City, and one-fifth to the United Rim Co., a corporation of Ohio.

1,201,122. Vehicle wheel rim. James H. Wagenhorst, assignor of one-fifth to the Goodyear Tire & Rubber Co.—both of Akron, Ohio; two-fifths to The B. F. Goodrich Co., and one-fifth to the United States Tire Co.—both of New York City.

1,201,129. Demountable rim. L. P. Woodbury, Berkeley, assignor of one-half to J. T. Parker, San Francisco—both in California.

1,201,198. Dust cap for tire valves. H. P. Kraft, Ridgewood, N. J.

1,201,199. Dust cap for tire valves. H. P. Kraft, Ridgewood, N. J.

THE UNITED KINGDOM.

PATENT SPECIFICATIONS PUBLISHED.

In order to give the public the advantage of having abridgments of specifications up to date while retaining their numerical sequence, applications for patents made subsequent to 1915 are given new numbers when their complete specifications are accepted, or become open to public inspection before acceptance. The new numbers start with No. 100,001 (without any indication of date), and supersede the original application numbers in all proceedings after acceptance of the complete specifications.

[ABSTRACTED IN THE ILLUSTRATED OFFICIAL JOURNAL, SEPTEMBER 6, 1916.]

7,192 (1915). Waders. D. Grant, 122 George street, Edinburgh.

7,193 (1915). Armored diving dress. W. P. Thompson, 6 Lord street, Liverpool.

7,194 (1915). Diving dress joints with rubber packing rings. W. P. Thompson, 6 Lord street, Liverpool.

7,228 (1915). Waterproof cloth recompression chamber for the treatment of divers overcome by excessive pressure. H. Dragerwerk and B. Drager, 53 Moislinger Allee, Lubeck, Germany.

7,285 (1915). Top lift for heels made from rubber, gutta percha, or a mixture of cork and rubber solution. Soc. Francaise Du Cuir Arme, 57 rue Alexandre Dumas, Paris.

7,296 (1915). Artificial foot which comprises a rubber block. A. Smith, 47 Bachelor Lane, Horsforth, Yorkshire.

7,368 (1915). Ladies' garter consisting of connecting straps above and below the knee. E. H. Reid, Chaldon Hill, Ellinbank, Victoria, Australia.

7,408 (1915). Reservoir pens. C. Bristow, 20 St. German's Road, Forest Hill, London.

7,464 (1915). Rubber heel core for artificial feet. J. F. Rowley, 25 West Madison street, Chicago, Ill.

100,874. Tire armor. J. K. Black, 22 Glen street, Paisley, Renfrewshire.

[ABSTRACTED IN THE ILLUSTRATED OFFICIAL JOURNAL, SEPTEMBER 13, 1916.]

7,536 (1915). Puttee having a woven elastic section. J. Boyd, Ebor Hall, Clonbur, Galway, Ireland.

7,538 (1915). Washer made of rubber and fabric. F. H. Rogers, Broad Sanctuary Chambers, Westminster.

Chemical Patents will be found on page 74. Machinery and Process Patents on page 79.

7,670 (1915). A map for use either as a plane or spherical map comprising elastic material. E. A. Reeves, Royal Geographical Society, Kensington Gore, London.

7,721 (1915). Fountain pen. F. Oliver, Clifton street, Stourbridge.

*7,790 (1915). Brassiere formed of a number of strips of elastic material. E. Guggenhiem, 252 West Twenty-ninth street, New York City.

7,810 (1915). Life buoy with rubber diaphragm and bands. P. De Luca, Scuola Allievi Uciali Royal Carabinieri, Rome, Italy.

7,816 (1915). Tire valve. J. Huybrechts, Mortsel-les-Anvers, Belgium.

*100,897. Cooling device for pneumatic tires. P. J. Cuddihy, P. O. Box 92, Rutherford, N. J.

*100,905. Detachable rim attachments. I. D. Walter, J. Brinkerhoff, E. F. Cole, J. G. Gant, T. Flournoy, J. W. Gant and S. A. Latimer, Harrisburg, Arkansas.

[ABSTRACTED IN THE ILLUSTRATED OFFICIAL JOURNAL, SEPTEMBER 20, 1916.]

7,930 (1915). Combined waterproof cape and ground-sheet. J. G. Savagar, 43 Brompton Road, London.

8,007 (1915). Rubber set brush. Brush Co., 21 Bucklersbury, London, and A. H. Timmis, "Fairmount," Harrow View, Harrow, Middlesex.

*8,029 (1915). Tire valves. R. H. Henemier, 501 West 138th street, New York City.

*8,036 (1915). Flanged wheels with rubber cushions. E. C. Madden, 1180 Broadway, New York City.

*8,054 (1915). Detachable rim. E. P. Calvin, Sardinia, Ohio.

8,118 (1915). Dolls, figures, toy animals and similar articles comprising a rubber bladder. H. S. Dean, 160a Fleet street, London.

8,165 (1915). Repairing pneumatic tires by wrapping with rubberized tape. W. A. Leslie, Central Hotel, Short Market street, Cape Town, South Africa.

*100,973. Springwheels with solid rubber tires. A. J. Anderson, 1340 Park avenue, Chicago, Ill.

101,018. Tire valves. Naamlooze Vennootschap Holland Ventiel, Heelsun, near Arnhem, Holland.

[ABSTRACTED IN THE ILLUSTRATED OFFICIAL JOURNAL, SEPTEMBER 27, 1916.]

8,228 (1915). Solid tire and attaching means. T. Gare, Cumberland House, Park Lane, Wembley, Middlesex.

8,390 (1915). Raft formed of tubular vessels of flexible rubbered materials. A. Candelon, 40 Rue de la Republique, St. Mande (Seine), France.

*8,511 (1915). Rubber-covered spring for vacuum bottles. E. C. R. Marks, 57 Lincoln's Inn Fields, London. (Landers, Frary & Clark, New Britain, Connecticut.)

8,533 (1915). Jar ring. H. Hartmann, Globus, Gummi und Asbestwerke Ges., Ahrensböck, Germany.

*101,028. Inflatable life preserver. B. Franklin, 2118 North Kostner Avenue, Chicago, Ill.

101,040. Life-saving belt or swimming appliance comprising a number of permanently inflated rubber balls. H. Brookes, 307 Pershore Road, Stirchley, Birmingham.

101,054. Detachable rim. W. M. Douglas, 6 Bean street, Waterford.

[ABSTRACTED IN THE ILLUSTRATED OFFICIAL JOURNAL, OCTOBER 4, 1916.]

8,627 (1915). Tire rim attachments. H. W. Van Meeteren, 58 Poplar Road, Edgbaston; A. Edwards, 44 Milcote Road, Bearwood, and H. Headley, "Merton," Oxford Road, Moseley—all in Birmingham.

8,727 (1915). Attaching block tires to rims. Mail Motors, Limited, and J. B. Gould, 3 The Crescent, Birmingham.

*8,756 (1915). Tennis or other inflated playing ball. R. H. Rosenfeld, 1895 East 71st street, Cleveland, Ohio, and F. T. Roberts, 17 Lee avenue, Trenton, N. J.

8,787 (1915). Apparatus for saving life for use in combination with waterproof suit. R. D. Buchanan, 7 Hencotes street, Hexham, Northumberland.

8,827 (1915). Pneumatic tire cover of rubber, canvas and leather. J. B. Salmon, Filleul street, Dunedin, New Zealand.

8,909 (1915). Respirator head-piece comprising rubber disks and bands. W. Single, The Grove, Woodford, Essex.

8,950 (1915). Cushion tire. W. E. H. Humphrys, Cranbourne Lodge, Hendon, Middlesex.

*101,065. Puncture closer consisting of a head and cap of soft rubber, etc. R. W. Sampson, Melba, New York.

101,074. Rubber strips in a device for turning the legs of high-legged boots. F. Ricks and British United Shoe Machinery Co., Union Works, Belgrave Road, Leicester.

*101,096. Air tube for tires. N. C. Doss, Rome, Georgia.

THE DOMINION OF CANADA.

ISSUED JULY 31, 1916.

170,488. Inflatable life preserver. The American Life Buoy Co., assignee of B. Franklin—both of Chicago, Ill.

170,493. Rubber sole. The Canadian Consolidated Rubber Co., Limited, assignee of W. B. Wiegand, and T. H. Rieder—all of Montreal, Quebec, Canada.

170,494. Hand rail of fabric and rubber for escalators. The Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, Canada, assignee of H. Z. Cobb, Winchester, Mass.

170,530. Life-saving garment comprising an inflatable tube. W. R. Pike and T. S. Morton, co-inventors—both of Tuxedo Park, New York.

*Denotes patents for American inventions.

170,578. Necktie having a sheet rubber lining. W. Hey, York City, York, England.

170,650. Hand rail for escalators comprising a channelled member of vulcanized rubber. Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, Canada, assignee of H. Z. Cobb, Winchester, Mass.

170,772. Air hose coupling. J. Roy, Los Angeles, Calif.

170,898. Gutta percha and rubber tire patch. J. G. Moomy, Erie, Pa.

170,962. Tire valve. A. Schrader's Son, assignee of R. H. Henemier—both of New York City.

170,963. Tire valve. A. Schrader's Son, assignee of R. H. Henemier—both of New York City.

171,002. Tire cover. T. Bélair, Montreal, Quebec, Canada.

171,007. Repair heel for rubber overshoe. J. Capdevila, New York City.

NEW ZEALAND.

ISSUED AUGUST 17, 1916.

36,659. Milking machine teat cup. The Ridd Milking Machine Co., Limited, Queen street, assignee of A. Ridd—both of New Plymouth, New Zealand.

ISSUED AUGUST 31, 1916.

36,986. Waterproof life buoy. J. B. Adams, Christchurch, N. Z.

*37,103. Molded inner tube for pneumatic tires, characterized by having a fixed formation when deflated. H. C. Boggs and C. E. Frost—both of Athens, Alabama.

FRENCH REPUBLIC.

PATENTS ISSUED (With Dates of Application).

480,007 (October 15, 1915). Improvements in detachable tires. J. H. Coffey and J. H. Coffey, Jr.

480,025 (January 25). Articulated metal tread band for wheels of vehicles equipped with dual elastic tires. Société Schneider & Cie.

480,144 (October 20). Protection plates for rubber tires and tires made of similar elastic materials. B. C. Gray.

480,166 (July 29). Special tire for automobiles. K. Pauli and Mme. Benninger.

480,259 (November 18). Improvements in rubber pads and findings for heels and soles of footwear. W. W. Phillips.

480,306 (November 24). Article to repair rubber hose by vulcanizing. A. B. Low.

480,363 (November 30). Anti-skid device for pneumatic tires. G. N. Givone.

480,387 (December 3). Vehicle tire. F. Lotter.

480,441 (December 14). Sectional pneumatic tire. G. M. Chanler.

TRADE-MARKS.

THE UNITED STATES.

94,243. Padlock design composed in part of a tire, and the words BATAVIA SECURITY TIRES—rubber tubes and tires. The Batavia Rubber Co., Batavia, N. Y.

94,091. The word LUSTRE—red mason-jar rings. R. E. Tongue & Bros. Co., Philadelphia, Pa.

96,225. The word PLASTINE—an amalgamating preparation of rubber. S. A. Conover, Philadelphia, Pa.

96,884. The words PAN AMERICAN—rubber tires and tubes for automobiles, aeroplanes, trucks and the like. Automobile Sundries Co., New York City.

79,127. The words BOSTON BELLE—rubber shoes, clothing, etc. The Tremont Stores, Inc., Boston, Mass.

82,333. The words and numeral BRUBALCOL No. 3—billiard-cloth. The Brunswick-Balke-Collender Co., Chicago, Ill.

82,334. The words and numeral BRUBALCOL No. 4—billiard-cloth. The Brunswick-Balke-Collender Co., Chicago, Ill.

94,090. The words BIG CHIEF—fruit jar rings. R. E. Tongue & Bros. Co., Philadelphia, Pa.

96,267. An illustration of a bee-hive with the letter B—tire-tape, rubber and adhesive patches. Berrodin Rubber Co., Philadelphia, Pa.

96,369. The words ADONIS QUALITY—solid and pneumatic tires, reliners, blow-out patches and tire patches composed of rubber, etc. Shadbolt & Boyd Iron Co., Milwaukee, Wis.

96,573. A representation of a roll of brake lining with a series of white transverse marks placed at regular intervals along the face of the brake lining—brake linings. Standard Woven Fabric Co., Walpole, Mass.

96,595. The word DUNDEE formed in a half circle over the letter A—insulated wire and cables. The Okonite Co., New York City.

96,596. The word DUNDEE formed in a half circle over the letter B—insulated wire and cables. The Okonite Co., New York City.

96,950. The numerals and word 2 IN 1—athletic ankle supports. H. J. Collis, Taunton, Mass.

95,880. Representation of a tire with the word PLUGIT in the center—tire-sealing compound. Cline, Crowell & McCorkle, Newton, N. C.

96,854. The word RAYNSTER—rain-coats. United States Rubber Co., New Brunswick, N. J.

THE DOMINION OF CANADA.

21,858. Representation of a hydroplane and the words MADE IN CANADA—waterproof and showerproof garments including headwear. Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, Canada.

THE UNITED KINGDOM.

371,918. The word NEGER—rubber erasers. Gebroeders Rikkers, Amsterdam, Holland.

371,957. The word ELK enlaced in a circle with a drawing of the animal of the same name—composition in the nature of a packing. Leicester Castings & Engineering Co., Leicester.

372,159. A monogram composed of the letters B. R. M.—rubber fuse cases. British Rubber Manufacturers, Limited, Agnes Works, Agnes Road, Acton, London, W.

372,580. The word NUGGER—beltings. Aktieselskap Den Norske Remfabrik, Christiania, Norway.

372,817. The word IMPACTOR—apparatus for registering the properties of the flight of golf balls. Charles Guthrie Guthrie, Glasgow.

373,018. The words BRITONS CUB—rubber heels, tips and pads for boots and shoes. Wood-Milne, Limited, Bow Lane, Preston Lancs.

373,131. A shield bearing crossed hockey clubs—tobacco pouches of rubber. J. B. Ingram & Son, The London India-Rubber Works, Felsted street, Hackney Wick, London, N. E.

373,170. The word VICEROY—braces and sock suspenders of elastic fabric containing rubber. Faire Bros., Limited, Leicester.

373,259. The word AUGTHOS—elastic belts and similar articles. Léon Thomas, Paris, France.

373,327. The words WATER MILL PAD on the wheel in a picture of a water mill—rubber heel pads for boots and shoes. Rocco Antonio Barilone, Deptford, London, S. E.

373,331. The word CLINCHER—all rubber goods included in Class 27. The North British Rubber Co., Limited, Castle Mills, Edinburgh.

373,332. The word CLINCHER—all goods included in Class 28—*Same.*

373,333. The word CLINCHER—all goods included in Class 31—*Same.*

373,334. The word CLINCHER—all goods included in Class 32—*Same.*

373,418. The words DANDY LION—packings. James Walker & Co., Limited, Poplar, London, E.

374,208. The word ELEPHANT—rubber insulated electric cables. Collender's Cable and Construction Co., London.

374,209. The word DAFFODIL— *Same.*

374,211. The word THISTLE— *Same.*

374,212. The word ROSE— *Same.*

THE FRENCH REPUBLIC.

1,310. The words LES CAOUTCHOUCTIERS RÉUNIS—supplies and sundries made of rubber, such as rubber heels and soles, interior "heel protectors," interior soles, rubber footwear. J. B. Jeuge, Clermond-Ferrand, Puy-de-Dôme.

1,311. The word TROTTIN— *Same.*

1,312. The word PATRIA— *Same.*

1,313. The word MIDINETTE— *Same.*

1,314. The word MINET— *Same.*

1,315. The word SCHAH— *Same.*

1,316. The word DOCKS— *Same.*

1,317. The word CHATON— *Same.*

1,318. The word COUPÉ— *Same.*

1,319. The word ANGORA— *Same.*

1,320. The word CHAT— *Same.*

1,321. The word CHAMPION— *Same.*

1,322. The word GLOBE— *Same.*

1,382. The word TOURISTE—tobacco pouches. Louis Guichard, Sainte-Claude, Jura.

4,081. The words V. A. BON—rubber nipples and rubber heels; sundry rubber goods. Yves Bourgeois, Nantes, Loire-Inférieure.

4,082. The words YA. BON—*Same.*

4,083. The word YABON— *Same.*

9,748. The initials L. A. N.—rubber goods such as tobacco pouches, soles and heels, footwear, waterproof fabrics, erasers, pen holders, etc. Société Lyonnaise de l'Afrique du Nord, Lyon.

10,047. The initials D. B.—small pouches containing a thin sheet of rubber and other material for dressing wounds. Madame Claudia Boizet Desroches, Lyon.

24,030. The word WOODITE—for rubber and gutta percha goods. Woodite Co., Limited, Mitcham-Common, Surrey, England.

24,148. The word DEXINE—rubber goods. Dexine, Limited, Dexine Works, Abbey Lane, Stratford, London, England.

161,654. The word PLASTINE—plastic materials. Société Générale pour la Fabrication des Matières Plastiques, Paris.

161,731. The words LE POILU—hard rubber combs. Société E. Maikignac et A. Robineau, Paris.

162,031. The words ROUE BLINDÉ—detachable wheels for rubber pneumatic tires to be used on motor vehicles. Société Française des Roues Amovibles, Ivry-Port, Seine.

162,196. The word CILFRANC—special rubber tube. Alfred Désiré Cillard, Paris.

162,227. The word PANDORE—rubber toys. Mlle. Valentine Thomson, Paris.

162,435. The word SIMPLEX—transmission and conveyor belts. Compagnie des Transporteurs Simplex, Paris.

162,642. The words MAROC SPÉCIAL—rubber heels. Emile Moyse, Paris.

162,643. The words BOSTON HEEL —*Same.*

162,644. The words MASCOTTE SPÉCIALE— *Same.*

162,645. The word PHÉNIX— *Same.*

162,646. The words AMERICAN BLACK—interior rubber heel protector. Emile Moyse, Paris.

DESIGNS.

THE UNITED STATES.

49,677. Non-skid tire. H. J. Schluckebier, Frankenmuth, Mich.

49,706. Tire tread. H. F. Davenport, assignor to Brunswick-Balke-Collender Co.—both of Chicago, Ill.

49,714. Non-skid tread. R. J. Stokes, assignor to Thermoid Rubber Co.—both of Trenton, N. J.

49,715. Non-skid tread. R. J. Stokes, assignor to Thermoid Rubber Co.—both of Trenton, N. J.

49,753. Tire. A. Y. Tucker, Mount Vernon, N. Y.

PRINTS.

4,488. WEARING APPAREL AND RUBBER GOODS—for wearing apparel and rubber goods. United States Rubber Co., New Brunswick, N. J., and New York City.

STATEMENT OF THE INDIA RUBBER WORLD.

Statement of the ownership, management, etc., required by the Act of Congress of August 24, 1912, of THE INDIA RUBBER WORLD, published monthly at New York, N. Y., for October 1, 1916.

STATE OF NEW YORK }
COUNTY OF NEW YORK } ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared E. M. MacPhee, who, having been duly sworn according to law, deposes and says that she is the Business Manager of THE INDIA RUBBER WORLD, and that the following is, to the best of her knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers, are:

Publisher, The India Rubber Publishing Co., 25 West Forty-fifth street, New York City.

Editor, Henry C. Pearson, 83 Agawam Road, Waban, Massachusetts.

Managing Editor, None.

Business Manager, E. M. MacPhee, 25 West Forty-fifth street, New York City.

2. That the owners are (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock):

Henry C. Pearson, 83 Agawam Road, Waban, Massachusetts.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not apear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by her.

E. M. MACPHEE, Business Manager.

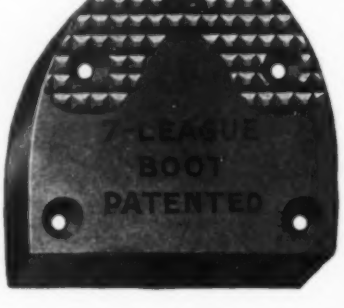
Sworn to and subscribed before me this 30th day of September, 1916.

[SEAL] FREDK. SPRENGER,
Notary Public, Westchester County.

Certificate filed in New York County.
New York County Clerk No. 188. Register's No. 8226.
(My commission expires March 30, 1918.)

IRON HEEL FOR RUBBER BOOT.

In the October, 1909, issue of THE INDIA RUBBER WORLD appeared an illustrated description of the "7-League" rubber boot, which has a special sewed leather sole. This boot has continued deservedly popular and now an improvement is offered, the full iron heel here shown. The strength and wearing quality of such a heel is self-evident. It is not at all cumbersome, weighing about the same as a leather heel owing to its hollow construction. Made of malleable iron, it is warranted not to break, and the back of the heel is corrugated in pyramid shape to prevent slipping. The boot is as well insulated as before, as the screws which hold the heel on do not enter the rubber sole. It is claimed that this heel cannot be pulled off and will not wear out during the life of the boot. [Mulconroy Co., Philadelphia, Pennsylvania.]



Review of the Crude Rubber Market.

NEW YORK.

THE long period of comparative stagnation that has characterized the New York market for the past four months is unusual in the history of the trade. While the large buyers are supposed to be carrying ample emergency stocks, it was believed that the fall, which is the initial period for selling rubber goods, would see active covering of crude rubber requirements. Lower prices have been confidently expected by the consuming trade, based on the assuring reports of increased production.

The month of October, just passed, has only shown slight evidences of the expected heavy buying movement, and instead of lower prices, the range of values has been, in fact, upward.

The temporary fright occasioned by the nearby German submarine operations was reflected in crude rubber by a sharp advance of 3 to 5 cents on October 9, when war risks went to 5 per cent and grave uncertainty was felt concerning the future of freights and rubber supplies. When the danger subsided, insurance receded to 1½ per cent and in a few days the market had declined about 2½ cents. Easier conditions were in evidence later and lower prices prevailed until the last week of the month, when the market became firmer and prices again took an upward trend. On October 30, First latex spot was 63½ cents, Smoked sheet ribbed, spot, 63 cents, January-June 63½ cents. The market was strong on all grades.

The unusual position of Upriver fine is due to drought and the consequent low water on the Amazon that has prevented the usual arrivals of rubber at this time of the year. Moreover, the supplies necessary for the *seringueros* are being detained by the same cause and will undoubtedly delay the future arrivals of Para sorts. Russian buying is another well-known reason for the strong position of Upriver fine. On October 30 this grade was selling for 81 cents spot in a firm market, futures 79 cents. For a period approximating the first three weeks of October, about 3,465 tons of rubber arrived at the port of New York, divided as follows: Plantation from Ceylon, 1,000 tons; Singapore, 400 tons; London and Liverpool, 600 tons; Para from Brazil, 500 tons; Centrals, 700 tons; Africans, 125 tons; Manicoba, 80 tons; Guayule, 60 tons.

LONDON.

The past month has been, altogether, quiet, with trading confined to dealers' sales and the covering of short requirements. Prices have been generally firm in a gradually advancing market that has recorded gains of about 2 cents during the month. The real buying interests have, however, failed to follow the rise in prices, preferring to take the necessary chances involved. This policy has been also observed in forward sales which have been freely offered here at prices that are too close to spot quotations to be interesting. On October 28, First latex was 59.7 cents, Smoked sheet 56.7 cents, and January-June, 60.2 cents in a strong market.

London imports for September were 6,000 tons, against 4,320 for August. Liverpool imports for September were 1,160 tons, against 1,100 tons for August.

SINGAPORE.

The result of the auctions held September 29, October 6, 12, 20 and 26 was as follows: Pale crêpe averaged 54.2 cents and Smoked sheet 53.6 cents. Amount sold, 2,555 tons. For the period from September 8 to 14 inclusive, the export duty on rubber was assessed on a price of 48.8 cents per pound for all grades.

NEW YORK QUOTATIONS.

Following are the quotations at New York one year ago, one month ago, and October 30, the current date:

PARA.	Nov. 1, 1915.	Oct. 1, 1916.	Oct. 30, 1916.
Upriver, fine, new	56 @57	73 @	81 @
Upriver, fine, old	57 @58	.....	.....
Islands, fine, new	54 @	65 @	72 @
Islands, fine, old	55 @	.....	.....
Upriver, coarse, new	44 @44½	43½@	47 @
Upriver, coarse, old	45 @	.....	.....
Islands, coarse, new	27 @27½	30 @	31½@
Islands, coarse, old	28 @	.....	.....
Cameta	28 @29	32 @	32 @
Caucho, ball, upper	44 @45	44 @	47½@
Caucho, ball, lower	42 @43	41 @	44 @45
PLANTATION.			
First latex crêpe — Spot	61½@62	Spot 60 @	63½@
First latex crêpe — Afloat	60 @60½	Futures 60 @	63½@
Amber crêpe, light — Spot		Spot 57½@	60 @
Amber crêpe, light — Futures		Futures 57½@	60 @
Brown crêpe, clean — Spot		Spot 54 @	58 @
Brown crêpe, clean — Futures		Futures 54 @	58 @
Smoked sheet, ribbed — Spot	61½@62	Spot 59½@	63 @
Smoked sheet, ribbed — Afloat	60 @60½	Futures 59½@	63 @63½
Fine sheets and biscuits, unsmoked	58 @58½	.....	.....
CENTRALS.			
Corinto	41 @42	42 @	45 @
Esmeralda, sausage	41 @42	41½@	44 @
Nicaragua, scrap	40 @41	41 @	43½@
Mexican plantation, sheet	.....	46 @52	45 @
Mexican, scrap	42 @	40 @	42 @
Mexican, slab	30 @	31 @	33 @
Manicoba	32 @39	42½@	32 @36
Mangabeira, sheet	32 @38	37½@	31 @37
Guayule	32½@	32 @33	33 @35
Balata, sheet	52½@53	73½@	69 @
Balata, block	44 @45	65 @	61 @
AFRICAN.			
Lopori, ball, prime	53 @54	50 @	55 @56
Lopori, strip, prime	.....	51 @	55 @56
Upper Congo, ball, red	52 @	51 @	54 @
Rio Nunez Niggers	53 @	54 @	55½@56
Conakry Niggers	53 @	52 @	55½@56
Massai, red	52 @	52½@	54½@55
Soudan, Niggers	.....	50 @	.....
Cameroon, ball, soft	.....	.....	40 @
Cameroon, ball, hard	.....	.....	46 @48
Benguela, No. 2 Superior	.....	38 @	39 @
Benguela, No. 2	32 @	34½@35	42½@
Accra, flake	.....	28 @	33 @
EAST INDIAN.			
Assam	47 @	38 @	41 @
Pontianak	6½@	8¼@	8½@
Gutta Siak	11½@12	13 @	13 @
Gutta red Niger	.....	26½@	26½@
Borneo III	.....	.....	.....
Gutta Percha, red Macassa	2.50@	1.60 @	1.88 @

MARKET CABLE SERVICE FROM LONDON.

The following market report has been cabled from Aldens' Successors, Limited, London:

	Standard	Smoked	
October 2 ..... *cents*	55.9	55.4	Quiet.
October 9	58.9	57.9	Firm.
October 16	57.9	57.0	Easier.

MARKET CABLE SERVICE FROM SINGAPORE.

The following reports of the weekly auctions held at Singapore have been cabled by The Waterhouse Co., Limited:

Date.	Crêpe. Price per lb.	Smoked Sheet. Price per lb.	Pounds Sold.	Market.
Sept. 29..*cents*	52.7	52.2	1,127,920	Good demand for all descriptions.
Oct. 6.....	53.1	52.7	1,111,040	Good demand for all descriptions.
Oct. 12.....	55.2	54.8	1,048,320	General and active demand.
Oct. 20.....	54.4	53.5	891,526	Flat.
Oct. 26.....	55.6	54.8	1,444,800	Active at the advance.

RESULTS OF AUCTIONS HELD IN SINGAPORE DURING THE FIRST HALF OF 1916.

1916.	QUANTITIES OFFERED AND SOLD. Offered. *Piculs.	Offered. Pounds.	Sold. *Piculs.	Sold. Pounds.	PRICES REALIZED, PER PICUL. SMOKED SHEET. Fine Ribbed.	Good Ribbed.	Fine Plain.	Good Plain.	UNSMOKED SHEET. Fine Ribbed.	Good Ribbed.	Fine Plain.	Good Plain.
January 5	5,243.29	699,105	3,342.11	445,614	†$195@203	$185@194	$190@193	$187@189	†$185@190	$ —@—	$187@190	$165@186
" 12	3,445.69	459,425	1,708.06	227,741	180@187	170@181	175@180	—@—	—@170	—@167	165@167	—@—
" 19	5,864.70	781,960	4,277.21	570,294	180@191	170@179	170@183	167@169	160@170	—@156	160@167	—@—
" 26	6,123.76	816,501	4,510.97	601,462	175@184	170@174	166@170	—@—	165@170	160@164	163@167	158@159
Totals	20,677.44	2,756,991	13,838.35	1,845,111								
February 1	3,534.68	471,290	2,671.19	356,158	146@155	140@145	143@145	136@138	138@144	—@—	140@144	—@—
" 9	5,018.63	669,150	4,556.01	607,468	165@174	160@164	161@166	—@—	163@167	159@160	158@166	147@148
" 16	5,720.87	762,782	3,928.44	523,792	184@197	179@192	184@189	—@—	—@175	—@169	—@165	—@—
" 23	6,923.51	923,134	4,464.14	595,218	171@181	153@170	165@166	—@156	162@165	145@153	139@150	—@—
Totals	21,197.69	2,826,356	15,619.78	2,082,636								
March 1	8,258.99	1,101,198	4,691.03	625,470	178@185	170@177	170@176	165@168	161@164	—@—	160@168	—@153
" 8	8,287.62	1,105,016	6,449.81	859,974	180@187	174@179	170@176	164@166	164@169	—@163	161@170	148@156
" 15	6,929.00	923,866	5,869.10	782,546	180@187	173@180	170@179	164@169	169@174	161@168	168@171	150@167
" 22	6,200.11	826,681	3,725.45	496,726	178@184	169@178	170@176	161@166	164@167	—@—	159@163	146@158
" 29	6,732.04	897,605	5,159.56	687,941	180@189	175@179	171@179	—@—	170@172	163@167	169@172	154@168
Totals	36,407.76	4,854,366	25,894.95	3,452,657								
April 5	4,939.76	658,634	2,949.85	393,313	176@181	170@175	170@176	—@—	160@164	—@—	157@162	—@—
" 12	7,457.16	994,288	4,796.86	639,581	175@182	168@175	173@175	—@165	163@168	159@160	155@165	—@—
" 19	5,891.12	785,482	3,894.29	518,905	168@174	162@167	164@168	160@162	160@168	157@159	157@162	145@151
" 27	7,283.32	971,109	4,575.69	610,092	165@171	157@163	159@165	—@—	154@159	—@—	156@158	—@152
Totals	25,571.36	3,409,513	16,216.69	2,161,891								
May 3	5,015.29	668,705	2,777.77	370,369	152@162	150@159	150@156	—@—	—@147	—@—	150@153	140@149
" 10	5,824.34	776,578	3,142.54	419,005	140@149	135@140	135@138	—@—	134@137	—@—	129@135	117@125
" 18	6,085.53	811,404	4,523.47	603,129	137@144	132@137	135@139	—@—	131@138	—@—	130@132	—@126
" 24	6,468.05	862,406	4,969.26	662,568	139@143	133@138	136@140	—@—	132@134	—@125	130@138	120@130
" 31	6,273.26	836,434	4,961.96	661,594	131@134	126@130	128@132	—@125	123@127	—@—	125@131	—@117
Totals	29,666.47	3,955,527	20,375.00	2,716,665								
June 7	5,447.50	726,333	4,490.13	598,684	134@138	130@133	131@137	128@130	126@128	—@—	129@132	123@126
" 15	6,722.30	896,306	5,036.51	671,534	122@129	117@123	120@123	118@119	120@124	117@118	118@127	115@116
" 21	6,569.73	875,964	4,978.03	663,737	123@127	118@122	120@122	—@117	115@116	109@110	111@115	104@110
" 28	6,353.72	833,829	5,515.01	735,334	115@121	112@114	110@114	107@108	106@110	—@—	105@109	—@—
Totals	25,093.25	3,332,432	20,019.68	2,669,289								
Grand Totals	158,513.97	21,135,185	111,964.45	14,928,249								

1916.	CREPE. Fine Pale.	Good Pale.	Pale Blanket.	Brown Blanket.	Fine Brown.	Good Brown.	Good Dark.	Barky.	Virgin and Pressed.	Loose.
January 5	†$205@210	$202@205	$ —@197	$190@192	$190@198	$170@189	$165@179	$150@171	$109@111	$ —@111
" 12	184@186	179@183	—@183	178@180	177@183	170@178	147@169	120@157	112@127	75@107
" 19	188@195	179@188	—@189	—@—	177@184	164@177	150@170	139@161	95@134	84@ 89
" 26	181@185	175@180	—@—	165@172	171@177	159@170	147@159	137@156	101@130	111@138
February 1	149@157	142@147	—@150	143@144	140@146	136@143	123@141	116@136	90@ 93	—@—
" 9	169@173	168@170	—@163	—@160	160@169	153@163	142@159	136@152	117@138	94@133
" 16	191@197	187@194	186@190	181@184	175@189	170@180	160@175	131@167	110@155	75@147
" 23	177@182	173@176	—@—	—@—	168@175	154@167	139@154	120@145	95@121	80@120
March 1	184@186	175@184	176@179	175@176	174@180	150@173	154@165	125@161	110@137	—@137
" 8	184@187	181@184	180@181	167@180	170@180	163@168	151@167	120@163	114@140	80@146
" 15	187@189	185@186	—@—	176@179	171@180	165@175	150@169	126@158	90@118	111@132
" 22	181@184	179@182	—@173	160@169	171@176	161@170	137@157	115@147	—@137	85@110
" 29	184@188	178@183	—@—	173@178	170@178	160@170	150@163	131@154	118@140	30@138
April 5	179@180	177@178	—@—	168@177	168@176	158@167	143@157	130@148	116@127	—@ 94
" 12	178@183	174@177	170@176	165@170	170@175	155@169	145@159	127@148	117@132	102@121
" 19	173@178	166@170	162@166	—@—	157@167	152@161	140@151	112@145	104@110	85@119
" 27	175@179	170@174	—@172	156@163	157@160	147@157	135@145	110@139	103@121	—@ 80
May 3	160@161	145@160	151@153	—@—	142@152	137@141	125@137	90@127	108@125	70@ 93
" 10	150@159	139@150	—@—	—@—	125@133	115@129	107@125	75@110	83@ 90	60@ 95
" 18	146@150	135@144	134@138	134@137	129@137	114@127	100@120	75@108	75@110	—@106
" 24	144@147	137@143	—@139	—@136	128@137	120@127	109@124	81@118	85@110	86@108
" 31	135@139	131@134	—@134	—@—	128@131	120@125	93@120	76@110	80@ 90	—@ 80
June 7	137@140	132@135	130@132	124@128	130@132	119@129	103@120	80@111	95@103	50@ 94
" 15	128@130	122@128	—@126	—@120	120@125	110@119	90@114	70@ 94	55@101	53@ 85
" 21	125@131	123@128	122@124	114@118	116@120	107@116	95@113	68@105	60@ 91	—@ 52
" 28	121@123	112@120	114@117	—@—	107@114	97@105	73@ 95	55@ 87	81@ 86	50@ 77

Highest Prices Realized:	1913.	1914.	1915.	First Half Year 1916.
Sheet, smoked fine ribbed	†$249	††$141	††$204	††$203
Sheet, smoked good ribbed		135	188	194
Sheet, smoked fine plain		132	185	193
Sheet, smoked good plain		128	183	189
Sheet, unsmoked fine ribbed	237	...	182	190
Sheet, unsmoked good ribbed		129	178	167
Sheet, unsmoked fine plain		130	180	190
Sheet, unsmoked good plain		127	170	186
Crêpe, fine pale thin	245	146	209	210
Crêpe, good pale thin		139	198	205
Crêpe, good pale blanket	...	...	195	197
Crêpe, good brown blanket	...	...	183	192
Crêpe, fine brown	221	133	190	198
Crêpe, good brown		124	179	189
Crêpe, good dark	191	122	171	179
Crêpe, barky	180	111	157	171
Scrap, virgin and pressed	201	108	120	111
Scrap, loose	185	97	127	111

* Picul = 133⅓ pounds.
† Quoted in S. S. dollars ($1.00 = 56.7 cents).
To obtain price per pound, United States currency, multiply price per picul by 42½ and point off four figures to the left.
Compiled by the Singapore Chamber of Commerce Rubber Association.

Recapitulation.	Total Quantities Offered. Pounds.	*Piculs.	Tons.	Total Quantities Sold. Pounds.	*Piculs.	Tons.
1912	1,341,472	10,061.04	599	1,169,262	8,769.47	522
1913	3,797,501	28,481.27	1,695	3,379,168	25,343.76	1,508
1914	8,254,594	61,909.45	3,685	5,973,179	44,798.85	2,666
1915	24,968,834	187,611.45	11,167	16,401,788	123,523.44	7,322
1916 (half year)	21,135,185	158,513.97	9,435	14,928,249	111,964.45	6,619

GUTHRIE & CO., LIMITED, Singapore, report [September 14, 1916]:
The following was the course of values:

	In Singapore per picul.*	Sterling equivalent per pound in London.	Equivalent per pound in cents.†
Sheet, fine ribbed smoked	$116@120	2/ 3¼@2/ 4¾	56.50@58.28
Sheet, good ribbed smoked	111@115	2/ 2¾@2/ 3½	54.22@56.00
Sheet, plain smoked	105@111	2/ 1½@2/ 2¾	51.70@54.22
Sheet, ribbed unsmoked	107@108	2/ 2 @2/ 2¼	52.70@52.95
Sheet, plain unsmoked	100@106	2/ 0½@2/ 1⅝	49.66@52.20
Crêpe, fine pale	117@120	2/ 4½@2/ 4¾	57.01@58.28
Crêpe, good pale	114@116	2/ 3½@2/ 3⅞	55.75@56.50
Crêpe, fine brown	112@114	2/ 3 @2/ 3½	54.73@55.75
Crêpe, good brown	106@111	2/ 1¾@2/ 2¾	52.20@54.22
Crêpe, dark	90@107	1/10⅜@2/ 2	45.35@52.70
Crêpe, bark	57@ 92	1/ 3½@1/10¾	31.42@46.12
Scrap, virgin	75@ 81	1/ 7¼@1/ 8½	39.02@41.56
Scrap, loose	50@ 84	1/ 2 @1/ 9¼	28.38@42.82

COMPARATIVE NEW YORK PRICES FOR OCTOBER.

In regard to the financial situation, Albert B. Beers (broker in crude rubber and commercial paper, No. 68 William street, New York) advises as follows:

"There has been but little change this month in the general market for Commercial Paper, although not so many city banks are buying as recently, but the best rubber names have gone freely at 4@4½ per cent., and those not so well known 5@5½ per cent.

	1916.*	1915.	1914.
Upriver, fine	$0.71@0.80	$0.55@0.57	$0.64@0.66
Upriver, coarse	.42@ .46	.42@ .45	.43@ .47
Islands, fine	.60@ .71	.50@ .54	.49@ .53
Islands, coarse	.29@ .33	.26@ .28	.26@ .28
Cametá	.31@ .35	.28@ .29	.29@ .32

*Figured only to October 27.

ANNUAL RUBBER PRODUCTION AND COMPARATIVE PRICES.

	Fine Para.		First Latex.	
Year.	Production, Tons.	Comparative Prices.	Production, Tons.	Comparative Prices.
1900	26,727	$0.83@1.11½	4	.....
1901	30,296	.76@ .95	5	.....
1902	28,668	.66@ .92	8	.....
1903	31,079	.78@1.13	21	.....
1904	29,984	.89@1.32	43	.....
1905	33,913	1.13@1.35	145	.....
1906	35,251	1.16@1.28	510	$0.86@1.50
1907	37,321	.69@1.24	1,000	.93@1.38
1908	38,848	.65@1.30	1,800	.75@1.05
1909	39,287	1.13@2.15	3,600	1.29@2.20
1910	37,954	1.16@2.90	8,200	1.40@2.25
1911	35,936	.90@1.67	14,419	1.14@1.68
1912	43,467	.93@1 22	28,518	1.03@1.38
1913	39,223	.59@1.10	47,618	.53@1.11
1914	37,215	.49@1.15	71,380	.55@ .80
1915	37,220	.75@ .91	107,867	.59@1.00
*1916	37,000	.....	150,000	.....

*Estimated.

PLANTATION RUBBER FROM THE FAR EAST.

TOTAL EXPORTS FROM MALAYA.

(From January 1, 1916, to dates named. Reported by Barlow & Co., Singapore. These figures include the production of the Federated Malay States, but not of Ceylon.)

To—	From Singapore. July 31, 1916.	From Malacca. July 31, 1916.	From Penang. July 31, 1916.	From Port Swetenham. September 11, 1916.	Totals.
United Kingdom. *lbs.*	17,765,687	3,967,630	13,174,434	20,679,766	55,587,517
The Continent	7,256,905	.....	51,200	.....	7,308,014
Japan	2,572,014	.....	.....	.....	2,572,014
Ceylon	267,963	.....	362,933	1,178,941	809,837
United States	47,692,888	.....	6,011,333	.....	53,704,221
Australia	184,314	.....	.....	.....	184,314
Totals	75,739,771	3,967,630	19,599,900	21,858,707	120,166,008
For same period, 1915	40,042,540	5,346,805	15,031,996	21,276,328	71,697,669
For same period, 1914	24,175,230	3,234,581	11,521,466	20,637,311	59,568,588
For same period, 1913	13,938,262	.....	8,222,533	19,946,488	42,107,283

FEDERATED MALAY STATES RUBBER EXPORTS.

An official cablegram from Kuala Lumpur gives the figures of the export of plantation rubber from the Federated Malay States during the month of September as 6,376 tons, against 5,782 tons in August last, and 3,984 tons in the corresponding month last year. This gives a total of 44,302 tons for nine months of the current year, against 30,657 tons in 1915 and 21,550 tons in 1914. This constitutes a record export from the Federated Malay States, eclipsing the previous month's export (which was also a record) by 594 tons. The following are the comparative figures:

	1914.	1915.	1916.
January *tons*	2,542	3,473	4,471
February	2,364	3,411	5,207
March	2,418	3,418	4,429
April	2,151	2,777	3,914
May	2,069	2,708	3,956
June	2,306	3,403	5,114
July	2,971	3,687	5,053
August	1,850	3,796	5,782
September	2,879	3,984	6,376
Totals	21,550	30,657	44,302

STRAITS SETTLEMENTS RUBBER EXPORTS.

An official cablegram from Singapore gives the figures of the export of plantation rubber from Straits Settlements ports during the month of August as 3,246 tons against 5,106 tons in July and 2,295 tons in the corresponding month last year. This gives a total of 31,964 tons for eight months of the current year against 20,228 tons in 1915 and 11,415 tons in 1914. Appended are the comparative statistics:

	1914.	1915.	1916.
January *tons*	1,181	2,576	4,443
February	1,703	2,741	3,359
March	1,285	2,477	4,481
April	1,548	1,978	4,219
May	1,309	3,588	3,274
June	1,480	2,249	3,836
July	1,584	2,324	5,106
August	1,325	2,295	3,246
Totals	11,415	20,228	31,964

These figures include transhipments of rubber from various places in the neighborhood of the Straits Settlements such as Borneo, Java, Sumatra and the non-Federated Malay States as well as rubber actually exported from the Colony, but *do not* include rubber exports from the Federated Malay States.

EXPORTS OF CEYLON GROWN RUBBER.

(From January 1 to September 11, 1915 and 1916. Compiled by the Ceylon Chamber of Commerce.)

To—	1915.	1916.
United States *pounds*	10,623,497	17,450,389
Canada and Newfoundland	384,940	6,720
France	301,472	1,073,754
Russia	332,200	248,374
Italy	.....	15,680
United Kingdom	16,837,653	14,690,012
Australia	518,937	697,551
India	1,000	728
Straits Settlements	119,933	43,680
Japan	236,251	218,189
Totals	29,355,883	34,445,577

(Same period 1914, 22,948,053 pounds; same period 1913, 16,477,894.) The export figures of rubber, given in the above table for 1914, include the imports re-exported. (These amount to 2,174,979 pounds from the Straits Settlements and 525,213 pounds from India.) To arrive at the total quantity of Ceylon rubber exported for that year deduct these imports from the total exports. The figures for 1915 and 1916 are for Ceylon rubber only.

IMPORTS AND EXPORTS OF RAW RUBBER AT CEYLON.

IMPORTS.
FROM AUGUST 1-28, 1916.

From—	POUNDS.
Malay Peninsula—	
Port Swettenham	144,073
Penang	60,868
Port Dickson	23,585
Singapore	19,138
Total	247,664
India—	
Tutcorin	49,628
Cochin	27,692
Alleppy	1,900
Total	79,220
Burma—	
Rangoon	1,097
Grand total	327,981

EXPORTS.
FROM AUGUST 1-31, 1916.

To—	POUNDS.
North America:	
United States—	
New York	1,960,518
Seattle	73,100
San Francisco	3,701
Total	2,037,319
Europe:	
United Kingdom—	
England—	
London	2,660,280
Liverpool	72,538
France (Marseilles)	92,436
Italy (Genoa)	8,960
Total	2,834,214
Asia:	
Japan—	
Kobe	12,320
Yokohama	11,480
Singapore	43,680
Total	67,480
Oceania:	
Australia	91,980
Grand total	5,030,993

RUBBER AND GUTTA EXPORTS FROM JAVA AND MADURA.

		June		Six Months Ending June	
		1915.	1916.	1915.	1916.
PLANTATION, TO—					
Holland	Ficus *pounds*	330	.....	22,359	.....
	Hevea	250,800	.....	1,084,600	211
	Hevea (to order)	.....	.....	4	.....
	Manihot (Ceara)	.....	.....	11,048	.....
	Castilloa	1,760	.....	2,288	.....
	Totals	252,890	.....	1,373,189	211
Great Britain	Ficus	499	10,305	12,705	18,775
	Hevea	371,800	950,400	2,246,200	3,339,600
	Manihot (Ceara)	1,998	31,264	9,788	48,792
	Castilloa	9,088	9,775	56,190	28,607
	Totals	383,385	1,001,744	2,324,883	3,435,774
Singapore	Ficus	6,037	3,520	9,299	24,240
	Hevea	77,000	301,400	294,800	2,041,600
	Manihot (Ceara)	.....	2,090	.....	20,106
	Castilloa	.....	880	.....	3,245
	Totals	83,037	307,890	304,099	2,089,191
United States	Ficus	.....	.....	.....	32,087
	Hevea	572,000	932,800	3,161,400	7,411,800
	Manihot (Ceara)	.....	.....	.....	11,114
	Totals	572,000	932,800	3,161,400	7,455,001
Other countries	Ficus	433	.....	433	2,792
	Hevea	15,400	61,600	279,400	268,400
	Totals	15,833	61,600	279,833	271,192
	Grand Totals	1,307,145	2,304,034	7,443,403	13,251,369
GUTTA PERCHA, TO—					
Singapore		13,486	39,290	313,214	265,767
GUTTA JELUTONG, TO—					
United States		.....	295	.....	295
Singapore		.....	.....	1,584	14,373
Totals		.....	295	1,584	14,668

EXPORTS OF INDIA RUBBER FROM MANAOS DURING AUGUST, 1916.

EXPORTERS.	NEW YORK. Fine.	Medium.	Coarse.	Caucho.	Totals.	EUROPE. Fine.	Medium.	Coarse.	Caucho.	Totals.	Grand Totals.
Suter & Co.....*kilos*	72,186	9,554	14,558	98	96,396	71,740	.....	.....	80,640	152,380	248,776
General Rubber Co. of Brazil....	184,638	22,951	33,908	14,034	255,531	165,178	12,730	4,562	145,830	328,300	583,831
Tancredo Porto & Co.....	100,453	11,449	20,442	344	132,688	22,822	6,637	150	17,510	47,119	179,807
J. G. Araujo.....	35,614	.....	5,775	150	41,539	12,066	671	4,178	1,913	18,828	60,367
Ohliger & Co.....	29,071	2,104	4,862	5,787	41,824	.....	.....	.....	.....	.....	41,824
Armazens Andresen	10,158	373	2,588	1,301	14,420	.....	.....	.....	.....	.....	14,420
Sintronio & Co.....	2,172	686	1,004	2,638	6,500	.....	.....	.....	.....	.....	6,500
Adelbert H. Alden, Ltd.....	1,700	.....	600	340	2,640	170	.....	.....	12,008	12,178	14,818
Th. Levy, Camille & Co.....	.....	.....	.....	.....	.....	.....	535	450	300	1,285	1,285
Mesquita & Co.....	.....	.....	.....	.....	.....	305	31	787	92	1,215	1,215
Semper & Co.....	.....	.....	935	62	997	.....	.....	.....	.....	.....	997
Totals, August, 1916	435,992	47,117	84,672	24,754	592,535	272,281	20,604	10,127	258,293	561,305	1,153,840
July, 1916	238,014	21,593	31,284	204,740	495,631	68,650	43,932	18,914	269,029	400,525	896,150
June, 1916	163,154	22,947	88,415	102,665	377,181	50,958	60,676	9,035	228,956	349,625	726,806
May, 1916	430,544	69,135	142,723	280,793	923,195	28,635	29,243	17,539	198,313	273,730	1,196,925
April, 1916	334,337	48,556	168,393	377,014	928,300	212,682	50,555	35,419	252,036	550,692	1,478,992
March, 1916	502,323	76,236	228,580	320,482	1,127,621	450,320	87,029	49,033	318,648	905,030	2,032,651
February, 1916	546,003	82,739	191,537	205,419	1,025,698	164,400	27,819	56,344	119,229	367,792	1,393,490
January, 1916	561,143	110,411	176,779	148,142	996,475	543,822	58,574	75,105	123,703	801,204	1,797,679

(Compiled by Suter & Co., Manáos.)

CRUDE RUBBER ARRIVALS AT THE PORT OF NEW YORK.

[The Figures Indicate Weights in Pounds.]

SEPT. 21.—By the steamer *Tapajoz* from Pará and Manáos:

	Fine.	Medium.	Coarse.	Caucho.	Total.
Meyer & Brown	157,400	14,400	39,300	1,800=	212,900
Davies, Turner & Co.....	285,000	6,800	29,500	20,300=	341,600
Henderson & Korn.....	21,300	18,200	79,400	1,700=	120,600
H. A. Astlett & Co.....	60,800	20,600	14,800	400=	96,600
Paul Bertuch	58,200	.....	14,000	2,800=	75,000
Arnold & Zeiss.....	45,500	5,700	18,200	200=	69,600
General Rubber Co.....	19,500	2,000	35,700	.....=	57,200
G. Amsinck & Co.....	44,700	.....	2,600	8,500=	55,800
Muller, Schall & Co.....	31,500	1,100	3,500	1,000=	37,100
F. D. Duerr & Co.....	13,000	.....	.....	6,100=	19,100
Aldens' Successors, Ltd....	.....	3,600	1,200	700=	5,500
Totals	736,900	72,400	238,200	43,500=	1,091,000

SEPT. 26.—By the steamer *Minas Geraes* from Pará and Manáos:

Meyer & Brown	29,500	1,800	37,900	.....=	69,200
Paul Bertuch	40,300	24,800	14,900	1,000=	81,000
E. T. Greiner	14,100	24,600	9,400	11,500=	59,600
Davies, Turner & Co.....	49,500	.....	6,300	1,700=	57,500
General Rubber Co.....	.....	5,300	41,800	.....=	47,100
H. A. Astlett & Co.....	22,200	.....	21,200	.....=	43,400
Arnold & Zeiss.....	3,200	.....	27,100	.....=	30,300
Henderson & Korn.....	.....	3,900	18,000	7,300=	29,200
Hagemeyer & Brunn.....	7,300	700	1,300	4,600=	13,900
Aldens' Successors, Ltd....	800	3,800	3,800	.....=	8,400
Muller, Schall & Co.....	4,000	.....	2,400	1,300=	7,700
Totals	170,900	64,900	184,100	27,400=	447,300

SEPT. 29.—By the steamer *Francis* from Pará and Manáos:

Meyer & Brown	.....	.....	14,500	.....=	14,500
Davies, Turner & Co.....	53,600	.....	11,500	32,800=	97,900
H. A. Astlett & Co.....	22,500	27,100	12,100	.....=	61,700
Arnold & Zeiss.....	12,900	2,000	2,600	.....=	17,500
F. D. Duerr & Co.....	12,500	.....	.....	2,500=	15,000
Henderson & Korn.....	.....	1,800	11,200	.....=	13,000
Paul Bertuch	11,800	.....	1,200	.....=	13,000
Totals	113,300	30,900	53,100	35,300=	232,600

OCT. 14.—By the steamer *Sao Paulo* from Pará and Manáos:

Meyer & Brown.....	93,600	8,200	70,900	13,100=	185,800
Davies, Turner & Co.....	339,000	8,500	3,600	2,300=	353,400
Arnold & Zeiss.....	87,100	14,900	37,000	600=	139,600
Hagemeyer & Brunn.....	58,300	9,100	10,900	11,600=	89,900
H. A. Astlett & Co.....	57,000	14,400	11,800	3,000=	86,200
Paul Bertuch	50,900	11,300	15,300	.....=	77,500
Muller, Schall & Co.....	25,400	2,900	9,000	13,500=	50,800
Aldens' Successors, Ltd....	6,700	23,000	22,000	400=	52,100
Robinson & Co.....	18,200	5,800	4,200	.....=	28,200
Henderson & Korn	.....	.....	4,100	.....=	4,100
General Rubber Co.....	.....	1,300	600	.....=	1,900
Totals	739,300	99,400	189,400	44,500=	1,069,400

PARAS.

		Pounds.
SEPTEMBER 27.—By the *Advance*=Colon:		
G. Amsinck & Co. (Fine).....	18,000	
G. Amsinck & Co. (Coarse)....	7,000	
Neuss, Hesslein & Co. (Fine)...	6,000	31,000
SEPTEMBER 22.—By the *Santa Marta*=Cartagena:		
G. Amsinck & Co.....	8,000	
Mecke & Co.	2,000	
Cowdrey & Co.....	1,500	11,500
SEPTEMBER 26.—By the *Metapan*=Port Limon:		
A. Held	1,500	
Isaac Brandon & Bros.....	1,000	2,500
SEPTEMBER 27.—By the *Advance*=Colon:		
G. Amsinck & Co.....	10,500	
Fidanque Bros. & Co.....	1,500	12,000
SEPTEMBER 28.—By the *Almirante*=Cartagena:		
A. Held		1,000
OCTOBER 2.—By the *Tivives*=Barrios:		
A. Rosenthal & Sons.....	4,000	
Various	500	4,500
OCTOBER 2.—By the *Monterey*=Mexico:		
Steiger Trading Co.....	8,000	
Graham-Hinkley Co.	2,000	
Harburger & Stack	1,500	
J. A. Medina & Co.....	1,000	12,500
OCTOBER 2.—By the *Monterey*=Tampico:		
C. Tennant, Sons & Co.....		*60,000
OCTOBER 3.—By the *Pastores*=Port Limon:		
Isaac Brandon & Bros.....	1,500	
A. A. Linde & Co.....	2,000	
C. F. Hermandez & Co.....	500	4,000
OCTOBER 3.—By the *Yummi*=Mexico:		
American Trading Co.....		26,000
OCTOBER 7.—By the *Saramacca*=Cartagena:		
Andean Trading Co.....	3,000	
Pablo Calvet & Co.....	500	3,500
OCTOBER 9.—By the *Zacapa*=Colombia:		
Muller, Schall & Co.....	1,000	
G. Amsinck & Co.....	500	1,500
OCTOBER 11.—By the *Allianca*=Colon:		
G. Amsinck & Co.....	3,500	
I. S. Sembrada & Co.....	2,600	
Pablo Calvet & Co.....	8,400	
A. M. Capen's Sons.....	2,100	
American Trading Co.....	1,800	
Camacho, Roldan & Van Sickel.	1,200	19,600
OCTOBER 13.—By the *Ancon*=Colon:		
W. R Grace & Co.....		2,000
OCTOBER 13.—By the *Momus*=New Orleans:		
Various		60,000
OCTOBER 16.—By the *Esperanza*=Tampico:		
C. Tennant, Sons & Co.....		*70,000
OCTOBER 16.—By the *Esperanza*=Mexico:		
G. Schaumann & Co.....	7,000	
H. Marquardt & Co.....	2,500	
General Export & Commission Co.	500	10,000
OCTOBER 17.—By the *Colon*=Colon:		
Mecke & Co.....	3,100	
Piza Nephews & Co.....	4,000	
Knauth, Nachod & Kuhne.....	1,500	
Isaac Brandon & Bros.....	1,500	
Fidanque Bros. & Co.....	1,000	11,100
OCTOBER 17.—By the *Tenadores*=Port Limon:		
Fruit Despatch Co.....		4,000
OCTOBER 17.—By the *Carrillo*=Cortez:		
A. Rosenthal & Sons.....	2,000	
Eggers & Heinlein.....	1,500	
J. S. Sembrada & Co.....	1,000	4,500

AFRICANS.

		Pounds.
SEPTEMBER 23.—By the *Celtic*=Liverpool:		
Fred. Stern & Co.....		2,500
SEPTEMBER 25.—By the *Strathspey*=Havre:		
Robert Badenhop & Co., Inc.....		10,000
SEPTEMBER 25.—By the *Saxonia*=Liverpool:		
Arnold & Zeiss	22,500	
Robinson & Co.....	2,500	25,000
SEPTEMBER 29.—By the *Baltic*=Liverpool:		
Fred. Stern & Co.....		7,000
SEPTEMBER 29.—By the *Rondo*=Batavia:		
General Rubber Co.....	385,000	
Karl Schroeder	20,000	
Various	55,000	460,000
OCTOBER 2.—By the *Monadnock*=Bordeaux:		
Various		22,000
OCTOBER 5.—By the *Adriatic*=Liverpool:		
Various		11,000
OCTOBER 13.—By the *Marengo*=Hull:		
Aldens' Successors, Ltd.....		34,000
OCTOBER 17.—By the *Orduna*=Liverpool:		
Arnold & Zeiss.....	98,000	
Hagemeyer Trading Co.....	33,500	131,500
OCTOBER 17.—By the *Strathlorne*=Havre:		
Robert Badenhop Co., Inc.....		22,500
OCTOBER 17.—By the *Meuse*=Bordeaux:		
Robert Badenhop Co., Inc.....		22,500

		POUNDS.
OCTOBER 18.—By the *Idaho*=Hull:		
Robert Badenhop Co., Inc.		11,000
MANICOBAS.		
SEPTEMBER 25.—By the *Terence*=Bahia:		
Adolph Hirsch & Co.		40,000
SEPTEMBER 25.—By the *Atahualpa*=Parnahyba:		
G. Amsinck & Co.	16,000	
Rossbach Bros. & Co.	30,000	
Various	12,000	58,000
SEPTEMBER 26.—By the *Minas Geraes*=Bahia:		
Lawrence Johnson & Co.	25,000	
Adolph Hirsch & Co.	5,000	
Various	12,000	42,000
SEPTEMBER 29.—By the *Francis*=Pernambuco:		
Rossbach Bros. & Co.		38,000
SEPTEMBER 29.—By the *Francis*=Natal:		
Various		12,500
SEPTEMBER 29.—By the *Francis*=Ceara:		
Various		75,000
OCTOBER 14.—By the *Sao Paulo*=Pernambuco:		
Lawrence Johnson & Co.		5,000
OCTOBER 17.—By the *Orduna*=Liverpool:		
Arnold & Zeiss.		160,000
PLANTATIONS.		
SEPTEMBER 22.—By the *Muncaster Castle*=Singapore:		
Meyer & Brown	40,000	
Edward Maurer & Co., Inc.	45,000	
Charles T. Wilson Co., Inc.	13,500	
Robinson & Co.	72,000	
H. R. Jefferds	11,200	
Henderson & Korn	470,000	
Arnold & Zeiss	18,000	
J. T. Johnstone & Co.	530,000	
Fox & Co.	100,000	
W. R. Grace & Co.	4,500	
Goodyear Tire & Rubber Co.	130,000	
L. Littlejohn & Co.	428,960	1,862,100
SEPTEMBER 22.—By the *Suveric*=Colombo:		
Meyer & Brown	80,000	
L. Littlejohn & Co.	84,560	
Goodyear Tire & Rubber Co.	33,500	
W. H. Stiles & Co.	45,000	
Arnold & Zeiss	103,000	
Robinson & Co.	7,000	
J. T. Johnstone & Co.	5,000	
Henderson & Korn	27,000	385,060
SEPTEMBER 23.—By the *Volodia*=London:		
Arnold & Zeiss	115,000	
J. T. Johnstone & Co.	40,000	
Raw Products Co.	11,200	
Robinson & Co.	9,000	175,200
SEPTEMBER 23.—By the *Egyptian Transport*=Colombo:		
Meyer & Brown	85,000	
L. Littlejohn & Co.	74,920	
W. H. Stiles & Co.	11,200	
Edward Maurer & Co., Inc.	16,600	
W. R. Grace & Co.	11,200	
J. T. Johnstone & Co.	20,000	
Arnold & Zeiss	100,000	318,320
SEPTEMBER 25.—By the *Merton Hall*=Colombo:		
Meyer & Brown	280,000	
L. Littlejohn & Co.	42,560	
Arnold & Zeiss	25,000	
W. H. Stiles & Co.	25,000	
Edward Maurer & Co., Inc.	2,200	374,760
SEPTEMBER 27.—By the *St. Bede*=Singapore:		
Meyer & Brown	150,000	
General Rubber Co.	185,000	
Edward Maurer & Co., Inc.	150,000	
J. T. Johnstone & Co.	185,000	
E. J. Curry	100,000	
Arnold & Zeiss	70,000	
Fred. Stern & Co.	60,000	
Fox & Co.	45,000	
H. R. Jefferds	11,200	
Rubber Trading Co.	18,000	
Aldens' Successors, Ltd.	30,000	
Charles T. Wilson Co., Inc.	120,000	
Robinson & Co.	175,000	
L. Littlejohn & Co.	781,760	
Henderson & Korn	510,000	
Robert Badenhop & Co., Inc.	11,200	
Goodyear Tire & Rubber Co.	90,000	2,692,160
SEPTEMBER 29.—By the *Rondo*=Batavia:		
Meyer & Brown	100,000	
General Rubber Co.	35,000	
Fox & Co.	80,000	
Rubber Trading Co.	2,000	
G. Amsinck & Co.	430,000	
Henderson & Korn	250,000	
Charles T. Wilson Co., Inc.	27,000	
G. Wechmar & Co.	70,000	
J. T. Johnstone & Co.	100,000	
Manhattan Rubber Manufacturing Co.	120,000	
W. R. Grace & Co.	50,000	
Edward Maurer & Co., Inc.	350,000	
Goodyear Tire & Rubber Co.	160,000	
Aldens' Successors, Ltd.	20,000	
Joosten & Jansen	85,000	
Stein, Hirsch & Co.	75,000	
L. Littlejohn & Co.	127,860	
Arnold & Zeiss	9,000	
Various	200,000	2,290,860
SEPTEMBER 30.—By the *Manchuria*=London:		
Meyer & Brown	70,000	
Goodyear Tire & Rubber Co.	115,000	
Charles T. Wilson Co., Inc.	50,000	
Raw Products Co.	22,500	
Rubber Trading Co.	8,000	265,500
OCTOBER 2.—By the *Alaunia*=London:		
J. T. Johnstone & Co.	95,000	
Robinson & Co.	40,000	
Hagemeyer Trading Co.	25,000	160,000
OCTOBER 3.—By the *Kazembe*=Colombo:		
Meyer & Brown	90,000	
L. Littlejohn & Co.	421,120	
W. R. Grace & Co.	4,500	
Henderson & Korn	59,000	
Arnold & Zeiss	135,000	
Charles T. Wilson Co., Inc.	16,000	
Aldens' Successors, Ltd.	11,500	
J. T. Johnstone & Co.	16,000	
Goodyear Tire & Rubber Co.	60,000	
Robinson & Co.	30,000	
Edward Maurer & Co., Inc.	45,000	
W. H. Stiles & Co.	185,000	
Various	20,000	1,087,120
OCTOBER 3.—By the *Minnesota*=London:		
Fred Stern & Co.		22,500
OCTOBER 5.—By the *Pannonia*=London:		
Meyer & Brown	80,000	
Arnold & Zeiss	235,000	
General Rubber Co.	195,000	
Michelin Tire Co.	90,000	600,000
OCTOBER 5.—By the *Minnehaha*=London:		
Meyer & Brown	100,000	
Edward Maurer & Co., Inc.	30,000	
General Rubber Co.	100,000	
Fred Stern & Co.	16,000	
Rubber Trading Co.	22,500	
Charles T. Wilson Co., Inc.	9,000	
G. R. Henke	9,000	286,500
OCTOBER 7.—By the *Philadelphia*=London:		
Fred Stern & Co.		13,500
OCTOBER 9.—By the *City of Corinth*=Colombo:		
Meyer & Brown	350,000	
L. Littlejohn & Co.	112,000	
Arnold & Zeiss	135,000	
W. H. Stiles & Co.	70,000	
J. T. Johnstone & Co.	33,500	
Robinson & Co.	9,000	
Edward Maurer & Co., Inc.	2,200	
Various	5,000	716,700
OCTOBER 9.—By the *Castlemoor*=Colombo:		
Meyer & Brown	275,000	
L. Littlejohn & Co.	56,000	
Goodyear Tire & Rubber Co.	33,500	
J. T. Johnstone & Co.	22,500	387,000
OCTOBER 13.—By the *Lancastrian*=London:		
Rubber Trading Co.	30,000	
Charles T. Wilson Co., Inc.	25,000	55,000
OCTOBER 17.—By the *City of Naples*=Singapore:		
Meyer & Brown	11,000	
Edward Maurer & Co., Inc.	36,000	
General Rubber Co.	90,000	
Fox & Co.	11,000	
Goodyear Tire & Rubber Co.	40,000	
Charles T. Wilson Co., Inc.	50,000	
H. R. Jefferds	5,000	
Robinson & Co.	60,000	
Henderson & Korn	205,000	
Raw Products Co.	11,000	
L. Littlejohn & Co.	151,200	
Arnold & Zeiss	32,000	
J. T. Johnstone & Co.	160,000	862,200

CRUDE RUBBER ARRIVALS AT SEATTLE.

Consignee is given first, followed by shippers. Figured 130 pounds net to the case.

PLANTATION.		POUNDS.
TO SEATTLE.		
OCTOBER 2.—By the steamer *Yokohama Maru.*		
Firestone Tire & Rubber Co.		
The Waterhouse Co.		131,950
W. R. Grace & Co.		
Sandilands, Buttery Co.	8,320	140,270
TO SAN FRANCISCO.		
OCTOBER 2.—By the steamer *Shintsu Maru.*		
Goodyear Tire & Rubber Co.		
Planters Stores & Agency Co.		3,380
TO SEATTLE.		
The B. F. Goodrich Co.		
W. T. Easley		465,530
Firestone Tire & Rubber Co.		
The Waterhouse Co.		240,890
Henderson & Korn.		
East Asiatic Co.	16,120	722,540
TO AKRON.		
OCTOBER 7.—By the steamer *Tacoma Maru.*		
The B. F. Goodrich Co.		
W. T. Easley	118,950	
Guthrie & Co.	98,280	
Firestone Tire & Rubber Co.		
The Waterhouse Co.	57,220	274,450
TO SEATTLE.		
OCTOBER 10.—By the steamer *Kaifunezan Maru.*		
The B. F. Goodrich Co.		
W. T. Easley	737,360	
Henderson & Korn.		
East Asiatic Co.	16,380	
Robinson & Co.		
East Asiatic Co.	36,660	
Arnold & Zeiss.		
Cicely Rubber Export Co.	6,370	796,770
TO AKRON.		
OCTOBER 13.—By the steamer *Manila Maru.*		
The B. F. Goodrich Co.		
W. T. Easley		254,410
TO AKRON.		
OCTOBER 17.—By the steamer *Protesilaus.*		
Firestone Tire & Rubber Co.		
The Waterhouse Co.		398,710
Goodyear Tire & Rubber Co.		
Wadleigh & Co.		185,120
Duff Development Co.		156,390
Harrisons & Crosfield.		110,890
Anglo Malay Rubber Co.		33,540
Rubber Estates of Johore.	28,860	913,510
TO NEW YORK.		
Arnold & Zeiss.		
Planters Stores & Agency Co.	9,100	
East Asiatic Co.		
Duff Development Co.	6,370	
Kuolanar Planters Rubber Co.	4,290	
L. Littlejohn & Co.		
Kulipali Rubber Co.	5,460	25,220
TO SEATTLE.		
W. R. Grace & Co.		
Whitehall & Co.	13,650	
Carson & Co.	10,920	
Glensheil Rubber Estate.	5,070	
R. T. Reid & Co.	3,250	
Mansfield & Co.	2,860	
Cheras Rubber Estate.	2,470	
Sungei Burun Rubber Estate.	2,470	
Arnold & Zeiss.		
Third Mile Rubber Co.	4,550	
R. T. Reid & Co.	1,950	47,190
GUTTA JELUTONG.		
TO SAN FRANCISCO.		
OCTOBER 2.—By the steamer *Shintsu Maru.*		
Bowers Rubber Works.		
Katz Bros.		3,380
TO SEATTLE.		
L. Littlejohn & Co.		
Katz Bros.		14,950

CUSTOM HOUSE STATISTICS.

PORT OF DETROIT—AUGUST, 1916.

IMPORTS:	POUNDS.	VALUE.
Rubber scrap	43,337	$1,112
EXPORTS:		
Rubber scrap	2,428	$173
India rubber boots.....*pairs*	3,128	7,233
India rubber shoes.....*pairs*	72	119
Automobile tires	.....	2,876
Other rubber tires	.....	79
Belting, hose, etc.	.....	3,448
All other manufactures of india rubber	.....	3,857
Total	.....	$17,785

PORT OF DETROIT—SEPTEMBER, 1916.

IMPORTS:		
Rubber scrap	30,000	$475
EXPORTS:		
Rubber scrap	95,050	$9,779
India rubber boots.....*pairs*	2,849	6,534
India rubber shoes.....*pairs*	4	8
Automobile tires	.....	4,816
Other rubber tires	.....	116
Belting, hose, etc.	.....	641
All other manufactures of india rubber	.....	4,597
Total	.....	$26,491

PORT OF NEW ORLEANS—AUGUST, 1916.

IMPORTS:	POUNDS.	VALUE.
India rubber	17,352	$6,362
EXPORTS:		
India rubber boots.....*pairs*	.....	$22
India rubber shoes.....*pairs*	.....	206
Automobile tires	.....	1,596
Belting, hose, etc.	.....	507
All other manufactures of india rubber	.....	1,520
Total	.....	$3,851

PORT OF NEW ORLEANS—SEPTEMBER, 1916.

IMPORTS:		
India rubber	24,848	$10,560

PORT OF NEW YORK—AUGUST, 1916.

IMPORTS:		
India rubber	15,599,321	$8,751,981
Balata	204,256	103,164
Gutta percha	632,079	72,243
Gutta jelutong (Pontianak)	4,254,623	171,830
Manufactures of india rubber	.....	26,388
Totals	20,690,279	$9,125,606
EXPORTS:		
India rubber	22,463	$9,357
Balata	129,823	58,985
Rubber scrap	62,266	10,632
Reclaimed rubber	34,859	6,694
India rubber boots.....*pairs*	2,508	5,682
India rubber shoes.....*pairs*	213,404	84,671
Automobile tires	.....	500,945
Other rubber tires	.....	241,976
Belting, hose, etc.	.....	295,632
All other manufactures of india rubber	.....	689,813
Total	.....	$1,904,387

PORT OF NEW YORK—SEPTEMBER, 1916.

IMPORTS:		
India rubber	13,133,575	$6,729,419
Balata	229,378	106,258
Gutta percha	41,528	11,205
Gutta jelutong (Pontianak)	845,056	43,133
Manufactures of india rubber	.....	33,569
Totals	14,249,537	$6,923,584
EXPORTS:		
India rubber	3,347	$1,700
Balata	135,307	67,254
Rubber scrap	52,731	9,430
Reclaimed rubber	40,857	7,026
India rubber boots.....*pairs*	656	1,690
India rubber shoes.....*pairs*	226,889	116,534
Automobile tires	.....	405,483
Other rubber tires	.....	113,833
Belting, hose, etc.	.....	176,433
All other manufactures of india rubber	.....	418,727
Total	.....	$1,318,110

PORT OF SAN FRANCISCO—AUGUST, 1916.

IMPORTS:		
India rubber	558,730	$306,780
Rubber scrap	500	80
Manufactures of india rubber	.....	2,394
Totals	559,230	$309,254
EXPORTS:		
India rubber boots.....*pairs*	145	$881
India rubber shoes.....*pairs*	6,052	5,105
Automobile tires	.....	197,097
Other rubber tires	.....	21,944
Belting, hose, etc.	.....	57,074
All other manufactures of india rubber	.....	37,549
Total	.....	$319,650

PORT OF BOSTON—SEPTEMBER, 1916.

IMPORTS:		
India rubber	45,761	$18,701
Gutta jelutong (Pontianak)	170,000	6,771
Rubber scrap	50,207	3,321
Manufactures of india rubber	.....	1,446
Totals	265,968	$30,239
EXPORTS:		
Rubber scrap	2,946	$884
India rubber boots.....*pairs*	38,884	76,222
India rubber shoes.....*pairs*	105,643	45,858
Automobile tires	.....	791
Other rubber tires	.....	35
Belting, hose, etc.	.....	6,059
All other manufactures of india rubber	.....	44,044
Total	.....	$173,893

PORT OF CLEVELAND—SEPTEMBER, 1916

IMPORTS:		
India rubber	832,765	$397,997
Rubber scrap	132	9
Manufactures of india rubber	.....	254
Totals	832,897	$398,260

PORTS OF SEATTLE AND TACOMA—SEPTEMBER, 1916.

IMPORTS:		
India rubber	3,987,679	$2,016,039
Gutta percha	544,007	224,788
Gutta jelutong (Pontianak)	73,700	2,355
Totals	4,605,386	$2,243,182
EXPORTS:		
India rubber boots.....*pairs*	110	$536
India rubber shoes.....*pairs*	6,889	5,776
Automobile tires	.....	29,077
Other rubber tires	.....	2,472
Belting, hose, etc.	.....	6,385
All other manufactures of india rubber	.....	6,942
Total	.....	$51,188

RUBBER STATISTICS FOR THE UNITED STATES.

IMPORTS OF CRUDE AND MANUFACTURED RUBBER.

UNMANUFACTURED—*free:*	July, 1916. Pounds.	July, 1916. Value.	Seven Months Ending July, 1916. Pounds.	Seven Months Ending July, 1916. Value.
India rubber:				
From France	.....	.....	352,811	$236,921
Portugal	.....	.....	1,180,590	533,455
United Kingdom	3,453,428	$2,077,631	38,811,201	28,985,572
Central America and British Honduras	85,984	40,326	846,528	397,544
Mexico	77,529	37,669	2,073,772	851,452
Brazil	2,435,800	957,071	33,218,578	16,840,235
Other South America	386,187	180,836	3,516,478	1,746,741
East Indies	8,248,562	5,332,647	85,534,686	54,860,806
Other countries	46,898	39,234	518,883	399,917
Totals	14,734,388	$8,665,414	166,053,527	$104,852,643
Balata	148,639	62,109	1,399,637	561,741
Guayule gum	61,644	18,495	1,398,480	404,955
*Gutta jelutong	.....	.....	14,724,397	759,205
†Gutta jelutong	1,392,109	78,693	1,392,109	78,693
Gutta percha	210,558	23,488	2,142,566	227,756
Totals	16,547,338	$8,848,199	187,110,716	$106,884,994
Rubber scrap	811,431	60,834	9,283,782	752,284
Totals, unmanufactured	17,358,769	$8,909,033	196,394,498	$107,637,278
Chicle (*dutiable*)	574,661	$258,658	4,338,102	$1,832,244
MANUFACTURED—(*dutiable*):				
Gutta percha	.....	$43,569	.....	$96,671
India rubber	.....	29,169	.....	273,674
Totals, manufactured	.....	$72,738	.....	$370,345
Substitutes—elasticon, etc.	.....	$3,990	.....	$11,082

EXPORTS OF DOMESTIC MERCHANDISE.

MANUFACTURED—	July, 1916. Pounds.	July, 1916. Value.	Seven Months Ending July, 1916. Pounds.	Seven Months Ending July, 1916. Value.
Automobile tires:				
‡To Russia in Europe	.....	$234	.....	$868,529
England	.....	237,544	.....	4,573,580
Canada	.....	91,791	.....	600,485
Mexico	.....	10,716	.....	152,373
Cuba	.....	86,907	.....	401,253
Australia	.....	119,952	.....	1,294,009
New Zealand	.....	145,445	.....	779,240
Philippine Islands	.....	30,228	.....	279,877
Other countries	.....	198,699	.....	1,898,644
Totals	.....	$921,786	.....	$10,847,950
All other tires	.....	347,283	.....	1,740,691
Belting, hose and packing	.....	268,494	.....	2,082,460
Rubber boots.....*pairs*	24,886	51,173	305,244	689,592
Rubber shoes.....*pairs*	373,664	151,835	1,304,834	648,002
Scrap and old rubber	198,087	23,274	2,313,001	245,722
Reclaimed rubber	430,001	71,304	3,743,857	536,665
Other rubber manufactures	.....	737,292	.....	5,093,956
Totals, manufactured	.....	$2,572,441	.....	$21,887,078
Fountain pens.....*number*	14,041	$9,658	147,531	$82,919

*Free, January to June, 1916, (inclusive).
†Dutiable beginning July 1, 1916.
‡Not separately stated prior to January 1, 1916.

EXPORTS OF FOREIGN MERCHANDISE.

UNMANUFACTURED—	July, 1916. Pounds.	July, 1916. Value.	Seven Months Ending July, 1916. Pounds.	Seven Months Ending July, 1916. Value.
Balata	15,317	$6,708	494,345	$176,633
Guayule gum	.....	.....	.....	.....
Gutta jelutong	.....	.....	56,000	2,520
Gutta percha	.....	.....	2,383	2,095
India rubber	988,192	671,571	3,789,321	2,396,592
Rubber scrap and refuse	.....	.....	.....	.....
Totals, unmanufactured	1,003,509	$678,279	4,342,049	$2,577,840
Chicle	14,809	$4,874	77,566	$26,958
MANUFACTURED—				
Gutta percha	.....	.....	.....	$352
India rubber	.....	.....	.....	31,614
Totals, manufactured	.....	.....	.....	$31,966

EXPORTS OF RUBBER GOODS TO NON-CONTIGUOUS TERRITORIES OF THE UNITED STATES.

MANUFACTURED—	July, 1916. Pounds.	July, 1916. Value.	Seven Months Ending July, 1916. Pounds.	Seven Months Ending July, 1916. Value.
To Alaska:				
Belting, hose and packing	.....	$8,630	.....	$70,731
Boots and shoes...(*pairs*)	7,003	23,188	44,783	123,652
Other rubber goods	.....	2,880	.....	25,337
Totals	.....	$34,698	.....	$219,720
To Hawaii:				
Belting, hose and packing.	.....	$4,609	.....	$48,500
Automobile tires	.....	34,487	.....	318,109
Other tires	.....	2,993	.....	59,771
Other rubber goods	.....	7,272	.....	53,958
Totals	.....	$49,361	.....	$480,338
To Philippine Islands:				
Belting, hose and packing.	.....	$419	.....	$39,378
Boots and shoes...(*pairs*)	13,502	7,772	24,936	15,763
Tires	.....	34,257	.....	286,766
Other rubber goods	.....	5,463	.....	179,745
Totals	.....	$47,911	.....	$521,652
To Porto Rico:				
Belting, hose and packing.	.....	3,428	.....	$22,416
Automobile tires	.....	51,433	.....	272,120
Other tires	.....	915	.....	18,967
Other rubber goods	.....	10,500	.....	52,440
Totals	.....	$66,276	.....	$365,943

IMPORTS AND EXPORTS OF CRUDE AND MANUFACTURED RUBBER AT THE PORT OF NEW YORK.

IMPORTS.

Week Ending—	India Rubber. Pounds.	India Rubber. Value.	Scrap for Re-manufacture. Pounds.	Scrap for Re-manufacture. Value.	Balata. Pounds.	Balata. Value.	Gutta Percha. Pounds.	Gutta Percha. Value.	Chicle. Pounds.	Chicle. Value.
September 22, 1916	.....	$5,638*	.....	.....	.....	.....	.....	$12,103†	.....	.....
	3,003,963	1,671,436	85,756	$5,286	100,359	$53,814	9,791	1,152	.....	.....
September 29, 1916	.....	9,164*	.....	.....	.....	.....	.....	197†	.....	.....
	5,704,085	2,933,808	64,456	4,162	62,842	26,699	2,411	361	46,439	$28,674
October 6, 1916	.....	1,410*	.....	.....	.....	.....	.....	2†	.....	.....
	7,917,017	4,122,820	160,186	13,507	18,690	8,282	.....	.....	.....	.....
October 13, 1916	.....	11,821*	.....	.....	.....	.....	.....	.....	.....	.....
	2,346,559	1,278,037	219,787	6,588	159,939	102,390	.....	.....	.....	.....

EXPORTS.

FIGURES ISSUED FROM SEPTEMBER 25 TO OCTOBER 24, 1916.

EXPORTED TO—	Belting, Hose and Packing.	Footwear. Boots.	Footwear. Shoes.	Tires. Auto.	Tires. Other.	Insulated Wire and Cables.	Other mnf. of India Rubber.	Fountain Pens.	Chewing Gum.	Reclaimed Rubber.	Scrap Rubber.
NORTH AMERICA:											
Bermuda	$7	$23	$4	.....	$67	.....	$440	$5	.....	.....	.....
British Honduras	57	.....	.....	.....	.....	$16	82	.....	.....	.....	.....
Canada	.....	.....	.....	.....	.....	228	92	.....	.....	.....	.....
Central American States—											
Costa Rica	603	.....	.....	$2,188	.....	.....	1,002	.....	$542	.....	.....
Guatemala	188	.....	.....	454	330	.....	1,198	.....	887	.....	.....
Honduras	48	4	.....	1,040	.....	359	147	.....	60	.....	.....
Nicaragua	119	.....	.....	.....	.....	33	1,231	.....	.....	.....	.....
Panama	7,794	.....	930	2,077	1,537	12,672	3,520	32	1,551	.....	.....
Salvador	847	.....	.....	.....	340	132	1,992	.....	.....	.....	.....
Mexico	6,505	.....	8	7,841	5,496	7,803	14,377	25	18	.....	.....
Newfoundland	428	.....	8,854	243	86	490	1,203	145	257	.....	.....
West Indies—											
British—											
Barbados	45	.....	.....	861	106	.....	667	.....	.....	.....	.....
Jamaica	774	.....	.....	10,827	328	203	643	.....	.....	.....	.....
Trinidad and Tobago	416	.....	1,259	2,289	477	101	2,762	.....	19	.....	.....
Other British	272	.....	.....	1,253	7	118	195	5	16	.....	.....
Cuba	23,673	224	1,310	36,981	16,069	27,717	37,373	540	1,706	.....	.....
Danish	6	.....	5	138	8	.....	13	5	.....	.....	.....
Dutch	39	.....	.....	677	50	79	453	.....	.....	.....	.....
French	.....	.....	31	4,182	485	183	69	168	.....	.....	.....
Haiti	21	.....	.....	628	10	60	110	.....	88	.....	.....
Santo Domingo	1,323	.....	.....	4,179	231	670	1,053	47	298	.....	.....
Totals, North America	$43,165	$251	$12,401	$75,858	$25,627	$50,864	$68,622	$972	$5,442	.....	.....
EUROPE:											
Azores Islands	.....	.....	$36	.....	.....	.....	$30	.....	.....	.....	.....
Denmark	$333	.....	11,325	$1,537	$140	$240	1,237	.....	.....	.....	.....
Finland	.....	.....	.....	.....	.....	.....	1,440	.....	.....	.....	.....
France	3,755	$318	16,316	22,591	4,333	333,628	35,670	.....	$13,447	$15,587	$6,480
Greece	.....	.....	.....	.....	.....	.....	.....	.....	1,124	.....	.....
Iceland	.....	.....	.....	.....	.....	.....	90	.....	.....	.....	.....
Italy	.....	.....	556	492	10,235	2,644	11,652	.....	.....	.....	10
Netherlands	.....	.....	584	10,292	1,022	2,100	5,382	$1,469	.....	.....	.....
Norway	6,227	.....	176	80	.....	10,977	978	.....	50	.....	.....
Portugal	424	.....	.....	75	.....	.....	65	.....	.....	.....	.....
Russia in Europe	.....	.....	.....	130	.....	9	11,282	.....	.....	.....	.....
Spain	268	.....	.....	13,222	.....	389	2,887	3,862	.....	.....	.....
Sweden	11,485	.....	.....	2,762	12	.....	1,227	.....	.....	.....	.....
Switzerland	.....	.....	.....	.....	.....	1,188	.....	.....	.....	.....	.....
United Kingdom—											
England	28,108	3,027	32,065	145,438	30,421	98,122	152,676	422	71,556	6,289	20,450
Scotland	19,872	.....	.....	144	15	.....	898	489	689	.....	230
Totals, Europe	$70,472	$3,345	$61,058	$196,763	$46,178	$449,297	$225,514	$6,242	$86,866	$21,876	$27,170
SOUTH AMERICA:											
Argentina	$19,333	.....	$2,553	$83,880	$1,539	$1,321	$27,321	$168	$494	.....	.....
Bolivia	201	.....	.....	983	98	112	644	.....	.....	.....	.....
Brazil	9,426	$69	670	74,028	2,867	57,578	22,823	1,994	40	.....	.....
Chile	23,374	278	632	19,360	4,063	18,155	12,494	.....	93	.....	.....
Colombia	790	.....	146	5,205	772	2,869	2,236	20	.....	.....	.....
Ecuador	128	.....	31	841	.....	473	1,195	.....	64	.....	.....
Guiana—British	74	.....	447	362	.....	13	198	.....	.....	.....	.....
Dutch	.....	.....	.....	91	.....	.....	33	2	.....	.....	.....
French	.....	.....	.....	40	.....	.....	3	.....	.....	.....	.....
Peru	4,173	.....	.....	348	786	1,295	7,598	71	218	.....	.....
Uruguay	2,354	.....	1,883	2,648	1,544	1,832	3,010	.....	1,296	.....	.....
Venezuela	1,728	.....	.....	12,194	1,116	2,668	3,811	17	.....	.....	.....
Totals, South America	$61,581	$347	$6,362	$199,980	$12,785	$84,484	$81,366	$2,272	$2,205	.....	.....
ASIA:											
China	$910	.....	$481	$1,382	.....	$32,195	$1,816	.....	.....	.....	.....
British India	1,358	.....	.....	3,322	$469	13	4,169	$1,215	$27	.....	.....
Straits Settlements	150	.....	726	2,424	6,334	.....	414	.....	.....	.....	.....
Dutch East Indies	.....	.....	.....	3,157	.....	4,080	921	.....	.....	.....	.....
Hongkong	56	.....	.....	1,190	568	1,010	78	.....	.....	.....	.....
Japan	.....	.....	2,335	.....	1,350	1,627	3,221	.....	.....	.....	.....
Russia in Asia	98	.....	.....	28	.....	.....	.....	.....	.....	.....	.....
Siam	.....	.....	.....	2,072	.....	3,762	38	.....	.....	.....	.....
Totals, Asia	$2,572	.....	$3,542	$13,575	$8,721	$42,687	$10,657	$1,215	$27	.....	.....
OCEANIA:											
British—											
Australia and Tasmania	$3,483	$265	$10,482	$7,064	$623	$6,654	$14,395	.....	$2,814	.....	.....
New Zealand	.....	354	.....	7,117	.....	1,606	2,187	.....	1,053	.....	.....
Philippine Islands	3,066	.....	8,325	7,216	526	13,457	7,754	.....	2,500	.....	.....
Totals, Oceania	$6,549	$619	$18,807	$21,397	$1,149	$21,717	$24,336	.....	$6,367	.....	.....
AFRICA:											
British Africa—											
West	.....	.....	$241	$200	.....	.....	$188	.....	.....	.....	.....
South	$28,411	.....	639	4,374	$516	$29	13,543	.....	$438	.....	.....
East	186	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Canary Islands	.....	.....	.....	.....	.....	.....	.....	.....	20	.....	.....
Egypt	.....	.....	.....	.....	.....	1,399	278	.....	3,579	.....	.....
Portuguese Africa	248	.....	.....	.....	.....	.....	66	.....	148	.....	.....
Totals, Africa	$28,845	.....	$880	$4,574	$516	$1,428	$14,075	.....	$4,185	.....	.....

*Manufactures of india rubber. †Manufactures of gutta percha.

British Trade in Rubber Goods.

IMPORTS OF MOTOR TIRES AND TUBES.*

From—	1913. £	1914. £	1915. £
Russia	253,156	152,304	31,305
Germany	929,755	426,566	322
Belgium	246,392	116,025	.....
France	351,215	331,070	282,764
Switzerland	17,227	1,139	12,654
Italy	531,039	588,202	230,081
United States	224,428	270,550	1,225,422
Other Foreign Countries	4,180	2,198	32,564
Totals from Foreign Countries	2,557,342	1,888,054	1,815,112
Totals from British Possessions	141	4,572	169,451
Totals	2,557,483	1,892,626	1,984,563

EXPORTS OF MOTOR TIRES AND TUBES.

To—			
Denmark (including Faroe Islands)	18,039	15,156	32,168
Germany	30,994	16,207	.....
Netherlands	9,619	20,261	26,863
Belgium	84,870	29,256	.....
France	68,071	61,204	89,914
Italy	32,494	15,272	31,279
Brazil	25,521	17,557	21,449
Argentine Republic	115,994	27,064	54,829
Other Foreign Countries	69,341	70,307	87,684
Totals to Foreign Countries	454,943	272,284	344,186
Cape of Good Hope	59,148	48,505	70,346
Transvaal	33,616	31,263	27,357
British East Indies	93,995	72,934	74,031
Australia	16,606	30,960	44,068
New Zealand	27,278	34,817	61,405
Other British Possessions	23,338	24,782	43,605
Totals to British Possessions	253,981	243,261	320,812
Totals	708,924	515,545	654,998

*A change of classification took place on September 29, 1915, when motor cars and motor chassis became subject to duty. Prior to that date, tires and tubes imported with complete motor cars were not taken into account; now they are. As from September 29, also the value of parts and accessories of motor tires have been added.

IMPORTS OF MOTORCYCLE TIRES AND TUBES.

From—			
Germany	35,420	8,811	.....
Belgium	2,823	76	.....
France	61,679	26,253	59,800
Other Foreign Countries	840	4,568	37,970
Totals from Foreign Countries	100,762	39,708	97,770
Totals from British Possessions	.....	.....	7,353
Totals	100,762	39,708	105,123

EXPORTS OF MOTORCYCLE TIRES AND TUBES.

To—			
Denmark	705	364	11,513
Germany	2,532	2,256	.....
Netherlands	1,806	2,666	3,787
Belgium	2,335	6,775	.....
Italy	1,099	5,300	7,685
Other Foreign Countries	3,577	7,191	11,423
Totals to Foreign Countries	12,054	24,552	34,408
Cape of Good Hope	4,042	4,037	8,511
Transvaal	6,005	8,801	5,418
British India	5,275	6,200	4,055
New Zealand	8,606	12,580	12,081
Other British Possessions	4,454	10,076	16,016
Totals to British Possessions	28,382	41,694	46,081
Totals	40,436	66,246	80,489

IMPORTS OF CYCLE TIRES AND TUBES.*

From—	1913. £	1914. £	1915. £
Germany	35,175	34,991	.....
Belgium	5,082	3,566	.....
France	69,107	38,931	53,935
Other Foreign Countries	1,930	1,903	11,219
Totals from Foreign Countries	111,294	79,391	65,154
Totals from British Possessions	800	25	.....
Totals	112,094	79,416	65,154

EXPORTS OF CYCLE TIRES AND TUBES.

To—			
Sweden	26,372	22,761	20,073
Denmark (including Faroe Islands)	45,554	58,668	74,978
Netherlands	48,791	60,605	132,842
Belgium	21,758	15,028	.....
Italy	24,578	16,633	14,843
Japan (including Formosa and Japanese leased territories in China)	88,786	19,504	1,189
Other Foreign Countries	36,358	31,941	29,851
Totals to Foreign Countries	292,197	225,140	283,776
Cape of Good Hope	24,121	16,865	14,888
Transvaal	25,572	23,289	20,214
British East Indies	45,727	38,888	75,551
New Zealand	11,152	10,281	14,229
Other British Possessions	12,780	16,086	22,391
Totals to British Possessions	119,352	105,409	147,273
Totals	411,549	330,549	431,049

*Not imported with complete cycles.

IMPORTS OF OTHER TIRES AND TUBES.*

From—			
United States	7,835	11,889	19,994
Other Foreign Countries	767	55	623
Totals from Foreign Countries	8,602	11,944	20,617
Totals from British Possessions	8	.....	.....
Totals	8,610	11,944	20,617

EXPORTS OF OTHER TIRES AND TUBES.

To—			
Belgium	9,351	2,422	.....
France	10,205	8,195	3,084
Spain	4,963	3,036	3,929
Italy	4,943	2,341	550
Roumania	1,843	5,948	.....
Argentine Republic	14,456	3,056	8,448
Other Foreign Countries	22,604	20,086	22,877
Totals to Foreign Countries	68,365	45,084	38,888
British India	43,620	36,334	43,216
Straits Settlements and Dependencies (including Labuan)	9,989	10,734	8,559
Other British Possessions	11,314	15,829	24,329
Totals to British Possessions	64,923	62,897	76,104
Totals	133,288	107,981	114,992

*Not imported or exported with complete vehicle.

IMPORTS OF RUBBER BOOTS AND SHOES BY QUANTITY.

From—	1913. Dozen Pairs.	1914. Dozen Pairs.	1915. Dozen Pairs.
Germany	22,644	19,296	.....
France	3,587	5,427	3,128
United States	65,806	58,906	151,198
Other Foreign Countries	3,668	1,633	2,302
Totals from Foreign Countries	95,705	85,262	156,628
Totals from British Possessions	66	86	3,834
Totals	95,771	85,348	160,462

EXPORTS OF RUBBER BOOTS AND SHOES BY QUANTITY.

To—			
Germany	7,306	1,644	.....
Netherlands	3,283	4,242	3,780
Belgium	7,821	6,862	.....
France	10,678	2,646	16,454
Austria-Hungary	1,700	606	.....
Turkey	14,767	8,654	.....
Other Foreign Countries	7,176	5,182	6,949
Totals to Foreign Countries	52,731	29,836	27,183
Cape of Good Hope	2,915	2,536	3,072
Natal	2,879	2,509	3,017
Transvaal	175	1,935	2,767
British East Indies	17,988	20,406	27,444
Australia	46,238	52,318	35,725
New Zealand	4,016	5,716	6,488
Other British Possessions	5,794	6,425	12,473
Totals to British Possessions	80,005	91,845	90,986
Totals	132,736	121,681	118,169

IMPORTS OF RUBBER BOOTS AND SHOES BY VALUE.

From—	1913. £	1914. £	1915. £
Germany	23,715	20,356	.....
France	3,027	5,101	2,770
United States	90,178	137,352	250,076
Other Foreign Countries	2,947	1,476	2,743
Totals from Foreign Countries	119,867	164,285	255,589
Totals from British Possessions	54	38	8,671
Totals	119,921	164,323	264,260

EXPORTS OF RUBBER BOOTS AND SHOES BY VALUE.

To—			
Germany	8,328	1,664	.....
Netherlands	3,612	4,579	4,030
Belgium	9,260	7,419	.....
France	11,940	3,180	40,198
Austria-Hungary	2,002	666	.....
Turkey	14,199	9,743	.....
Other Foreign Countries	11,202	8,876	9,860
Totals to Foreign Countries	60,543	36,077	54,088
Cape of Good Hope	2,793	2,449	2,733
Natal	2,476	2,279	2,459
Transvaal	199	1,759	2,567
British East Indies	17,183	18,974	20,629
Australia	43,067	45,929	32,279
New Zealand	5,000	7,813	8,862
Other British Possessions	6,745	8,476	15,156
Totals to British Possessions	77,463	87,679	84,685
Totals	138,006	123,756	138,773

EXPORTS OF ENGINE AND BOILER PACKING BY QUANTITY.

To—	1913. Cwts.	1914. Cwts.	1915. Cwts.
Russia	2,051	3,055	339
Sweden	1,418	1,927	1,821
Norway	2,225	3,018	4,368
Denmark (including Faroe Islands)	4,072	1,512	2,486
Germany	1,038	838	.....
Netherlands	2,390	3,352	3,109
Belgium	1,284	1,364	.....
France	1,737	897	823
Italy	345	319	590
*Egypt	2,215	1,521	.....
China (exclusive of Hongkong, Macao and leased territories)	2,773	2,453	3,181
Japan (including Formosa and Japanese			

	1913. Cwts.	1914. Cwts.	1915. Cwts.
leased territories in China)	1,280	1,495	314
United States	1,658	2,858	2,079
Chile	2,844	1,447	1,124
Brazil	2,954	791	660
Argentine Republic	3,793	1,811	3,254
Other Foreign Countries	11,233	5,621	4,490
Totals to Foreign Countries	45,310	34,279	28,638
†Egypt	.....	.....	1,372
Cape of Good Hope	712	694	541
Natal	1,469	1,301	2,243
Transvaal	1,152	1,710	3,532
British India	10,774	15,456	14,874
Straits Settlements and Dependencies (including Labuan)	1,646	1,735	2,454
Hongkong	1,749	3,319	2,751
Australia	6,904	7,503	7,573
New Zealand	3,336	5,578	3,948
Canada	2,293	1,444	803
Other British Possessions	2,596	2,666	3,560
Totals to British Possessions	32,633	41,413	43,651
Totals	77,943	75,692	72,289

EXPORTS OF ENGINE AND BOILER PACKING BY VALUE.

To—	1913. £	1914. £	1915. £
Russia	5,748	5,499	1,554
Sweden	6,065	6,401	5,885
Norway	6,447	7,998	13,793
Denmark (including Faroe Islands)	4,085	2,478	7,586
Germany	6,868	6,180	.....
Netherlands	7,603	8,567	8,678
Belgium	10,565	6,387	.....
France	12,413	7,748	10,517
Italy	2,203	2,212	6,145
*Egypt	4,832	5,309	.....
China (exclusive of Hongkong, Macao and leased territories)	5,521	4,449	6,051
Japan (including Formosa and Japanese leased territories in China)	5,645	8,851	2,703
United States	10,814	18,548	17,893
Chile	9,405	4,837	4,445
Brazil	14,818	4,827	3,485
Argentine Republic	10,135	4,835	6,909
Other Foreign Countries	25,741	20,467	20,373
Totals to Foreign Countries	148,908	125,594	116,017
†Egypt	.....	.....	7,964
Cape of Good Hope	3,439	2,626	2,972
Natal	4,915	4,322	7,045
Transvaal	5,623	5,664	10,117
British India	30,563	47,311	53,573
Straits Settlements and Dependencies (including Labuan)	9,653	3,394	8,168
Hongkong	5,155	6,787	5,240
Australia	23,296	18,928	29,148
New Zealand	6,671	7,518	8,661
Canada	13,194	9,156	6,412
Other British Possessions	13,816	12,391	13,991
Totals to British Possessions	116,235	123,097	153,392
Totals	265,233	248,691	269,409

*Including Anglo-Egyptian Sudan prior to 1914. From 1915 Egypt is shown as British Possession.
†Included in "Foreign Countries" prior to 1915.

IMPORTS OF APPAREL WATERPROOFED BY ANY PROCESS.

Totals from Foreign Countries	6,482	8,412	5,261
Totals from British Possessions	.....	44	115
Totals	6,482	8,456	5,376

EXPORTS OF APPAREL WATERPROOFED BY ANY PROCESS.

To—			
Sweden	89,098	67,843	30,765
Norway	70,862	55,840	24,171
Denmark (including Faroe Islands)	75,465	70,952	92,697
Germany	55,136	56,757	.....
Netherlands	42,685	25,096	13,674
Belgium	22,130	12,942	74
France	20,980	14,419	44,364
Portugal	6,857	5,052	4,511
Spain	6,602	6,180	5,082
Italy	5,770	2,760	1,166
Austria-Hungary	5,395	2,867	.....
Greece	5,316	3,375	1,238
Turkey	16,270	7,967	*211
United States	11,426	28,139	7,754
Cuba	7,376	7,232	2,626
Mexico	8,255	2,632	146
Chile	3,641	3,592	1,680
Brazil	21,190	6,023	3,814
Uruguay	8,395	1,197	1,225
Argentine Republic	34,820	21,989	12,116
Other Foreign Countries	44,084	37,143	25,433
Totals to Foreign Countries	561,753	439,997	272,747
Cape of Good Hope	17,684	12,957	16,776
Natal	6,371	4,714	8,056
Transvaal	8,420	6,214	14,245
British India	18,072	20,523	21,661
Australia	38,339	48,737	45,411
New Zealand	55,815	26,392	30,435
Canada	282,143	185,807	81,875
Other British Possessions	32,796	29,148	25,438
Totals to British Possessions	459,640	334,492	250,897
Totals	1,021,393	774,489	523,644

IMPORTS OF OTHER RUBBER MANUFACTURES.

From—	1913. £	1914. £	1915. £
Germany	344,317	258,289	.....
Belgium	65,934	50,496	98
France	62,828	48,529	46,956
Austria-Hungary	36,291	41,199	.....
United States	192,335	221,641	563,628
Other Foreign Countries	13,854	12,306	15,330
Totals from Foreign Countries	715,559	632,460	626,012
Totals from British Possessions	1,919	1,678	2,656
Totals	717,478	634,138	628,668

EXPORTS OF OTHER RUBBER MANUFACTURES.

To—			
Russia	50,813	38,758	16,734
Sweden	13,795	11,196	16,770
Denmark (including Farĉe Islands)	9,461	9,154	21,586
Germany	128,729	69,712	.....
Netherlands	83,301	72,533	64,594
Belgium	71,036	43,774	31
France	327,721	194,952	321,073
Switzerland	25,514	17,092	5,501
Spain	16,212	17,926	28,047
Italy	63,731	40,034	34,809
Austria-Hungary	46,574	30,533	.....
China (exclusive of Hongkong, Macao and leased territories)	13,034	8,341	8,882
Japan (including Formosa and Japanese leased territories in China)	29,580	15,460	12,198
United States	41,887	45,041	21,197
Mexico	10,572	3,482	956
Colombia	11,647	6,449	2,322
Chile	15,939	11,122	5,772
Brazil	47,263	26,217	23,015
Argentine Republic	114,825	75,888	45,892
Other Foreign Countries	63,741	53,509	68,253
Totals to Foreign Countries	1,185,375	791,124	697,632
Cape of Good Hope	33,501	26,689	41,168
Natal	26,189	19,212	18,084
Transvaal	29,234	23,005	23,114
British India, via.:			
Bombay (including Karachi)	24,780	24,197	31,189
Madras	6,336	6,089	5,868
Bengal, Assam, Bihar and Orissa	43,429	35,256	31,367
Burma	8,107	7,978	8,008
Hongkong	19,245	11,592	5,697
Australia:			
Western Australia	11,824	8,449	7,484
South Australia	12,504	9,451	6,297
Victoria	42,806	35,516	23,785
Queensland	7,051	7,845	7,836
New South Wales	49,553	35,904	21,851
Tasmania	2,014	1,673	1,225
New Zealand	45,178	40,697	47,984
Canada	68,710	56,439	38,857
Other British Possessions	40,410	37,012	42,620
Totals to British Possessions	470,871	387,004	362,434
Totals	1,656,246	1,178,128	1,060,066

The average £ value for 1913 was $4.864; for 1914, $4.97; for 1915, $4.745.
Compiled by the "India Rubber Journal," London.

UNITED KINGDOM RUBBER STATISTICS.

IMPORTS.

UNMANUFACTURED—	August, 1916. Pounds.	August, 1916. Value.	Eight Months Ending August, 1916. Pounds.	Eight Months Ending August, 1916. Value.
Crude rubber:				
From Dutch East Indies	1,302,300	$839,350	7,059,000	$4,874,773
French West Africa	59,000	23,862	1,238,000	643,405
Gold Coast	99,800	29,617	1,202,700	481,480
Other countries in Africa	733,100	372,375	5,885,000	3,063,551
Peru	309,900	170,256	1,197,400	768,883
Brazil	1,309,500	711,706	16,338,200	10,782,297
British India	92,200	54,531	2,424,700	1,784,281
Straits Settlements and dependencies, including Labuan	2,869,500	1,624,907	32,086,900	23,001,459
Federated Malay States	3,864,700	2,330,601	23,844,500	16,853,204
Ceylon and dependencies	2,010,600	1,220,573	13,915,000	9,936,234
Other countries	140,600	77,488	2,009,400	1,382,816
Totals	12,791,200	$7,455,266	107,200,800	$73,572,383
Waste and reclaimed rubber	312,800	$35,833	4,183,900	$542,920
Gutta percha	595,000	269,192	4,830,200	2,223,738
MANUFACTURED—				
Apparel, waterproofed	.....	$2,547	.....	$42,603
Boots and shoes...*dozen pairs*	18,577	104,135	146,202	1,237,888
Insulated wire	.....	26,318	.....	402,463
Submarine cables	.....	.....	.....	30,292
Automobile tires and tubes	.....	460,183	.....	8,772,383
Motorcycle tires and tubes	.....	34,910	.....	587,770
Cycle tires and tubes	.....	47,767	.....	377,051
Tires not specified	.....	3,489	.....	36,371

EXPORTS.

MANUFACTURED—	August, 1916. Pounds.	August, 1916. Value.	Eight Months Ending August, 1916. Pounds.	Eight Months Ending August, 1916. Value.
Apparel, waterproofed:				
To France	.....	$17,574	.....	$271,234
British South Africa	.....	21,406	.....	127,665
British East Indies	.....	2,447	.....	108,191
Australia	.....	32,539	.....	211,100
New Zealand	.....	16,151	.....	128,207
Canada	.....	71,890	.....	235,307
Other countries	.....	153,082	.....	888,886
Totals	.....	$315,089	.....	$1,970,590
Boots and shoes...*dozen pairs*	11,096	$54,097	71,604	$357,696
Insulated wire	.....	228,299	.....	1,644,250
Submarine cables	.....	558,791	.....	1,793,271
Automobile tires and tubes	.....	653,976	.....	3,965,755
Motorcycle tires and tubes	.....	39,003	.....	302,687
Cycle tires and tubes	.....	202,348	.....	2,270,803
Tires not specified	.....	129,086	.....	762,083
Manufactures not specified	.....	841,958	.....	5,290,345

EXPORTS—FOREIGN AND COLONIAL.

UNMANUFACTURED—	August, 1916. Pounds.	August, 1916. Value.	Eight Months Ending August, 1916. Pounds.	Eight Months Ending August, 1916. Value.
Crude rubber:				
To Russia	2,006,100	$1,257,073	8,592,400	$6,092,642
France	2,279,700	1,133,289	14,040,900	9,919,683
United States	2,757,900	1,640,382	40,065,100	29,426,606
Other countries	1,018,400	661,197	12,056,900	8,414,550
Totals	8,062,100	$4,691,941	74,755,300	$53,853,481
Waste and reclaimed rubber	41,500	$8,654	439,200	$75,829
Gutta percha	46,500	37,756	338,300	192,965
MANUFACTURED—				
Apparel, waterproofed	.....	$876	.....	$2,246
Boots and shoes..*dozen pairs*	1,040	6.093	19,535	111,759
Insulated wire	.....	9,944	.....	79,009
Automobile tires and tubes	.....	420,827	.....	2,862,896
Motorcycle tires and tubes	.....	5,012	.....	58,487
Cycle tires and tubes	.....	505	.....	110,961
Tires not specified	.....	1,161	.....	5,716

LONDON AND LIVERPOOL RUBBER STATISTICS.

IMPORTS.

SEPTEMBER, 1916.

UNMANUFACTURED—	London. Pounds.	London. Value.	Liverpool. Pounds.	Liverpool. Value.
Crude rubber:				
From German West Africa	.....	.....	10,400	$4,298
Java	60,200	$39,622	.....	.....
Other Dutch Possessions in Indian Seas	727,100	482,478	.....	.....
France	.....	.....	1,900	1,452
French West Africa	.....	.....	22,700	10,224
Portuguese E. Africa	3,700	1,690	.....	.....
Liberia	.....	.....	7,100	1,685
United States	400	190	131,700	62,613
Brazil	44,500	18,421	1,523,900	835,756
Uruguay	.....	.....	58,300	33,853
Bolivia	.....	.....	400	252
Gold Coast	.....	.....	58,400	21,049
Nigeria	.....	.....	153,600	43,868
Cape of Good Hope	9,700	16,132	.....	.....
British East Africa	12,700	5,212	400	519
Zanzibar	8,600	3,594	.....	.....
Seychelles	800	533	.....	.....
Aden	.....	.....	100	52
British India	392,200	226,547	.....	.....
Straits Settlements	3,165,900	1,522,562	544,700	295,625
Fed. Malay States	6,428,500	4,019,934	21,000	10,605
Ceylon	2,628,600	1,558,419	62,100	37,637
British North Borneo	236,700	154,514	.....	.....
New South Wales	5,200	4,070	.....	.....
Fiji Islands	4,200	1,142	.....	.....
British West Indies	2,000	1,418	.....	.....
British Guiana	300	143	800	457
Totals	13,731,300	$8,056,621	2,597,500	$1,359,945
Waste and reclaimed rubber:				
From France	13,400	$771	200	$29
Japan	700	167	.....	.....
United States	12,400	1,523	46,100	7,102
Brazil	.....	.....	15,200	1,071
Argentina	15,600	1,666	.....	.....
Channel Islands	300	14	.....	.....
Cape of Good Hope	9,500	1,223	.....	.....
Natal	5,900	119	.....	.....
New Zealand	10,400	890	.....	.....
British West Indies	2,900	238	.....	.....
Totals	71,100	$6,611	61,500	$8,202

EXPORTS.

Waste and reclaimed rubber manufactures of the United Kingdom:				
To France	10,200	$1,428	.....	.....
Spain	44,900	3,303	1,400	$248
Italy	137,400	7,521	2,500	562
United States	346,800	22,010	900	67
Russia	.....	.....	134,400	27,061
Denmark	.....	.....	6,700	1,228
Japan	.....	.....	45,600	6,750
Totals	539,300	$34,262	191,500	$35,916

RE-EXPORTS.

Crude rubber:				
To Russia	.....	.....	970,100	$605,377
Sweden	71,900	$43,944	11,200	10,472
Norway	15,700	8,568	6,800	4,284
Denmark	100,700	60,090	10,300	3,151
France	1,324,800	702,700	560,100	341,030
Spain	22,900	17,731	23,200	12,638
Italy	235,200	154,214	89,600	45,249
Japan	.....	.....	10,500	7,378
United States	2,610,100	1,465,057	69,200	33,453
Argentina	8,800	7,116	.....	.....
Victoria	.....	.....	26,800	17,184
New South Wales	600	357	.....	.....
Canada	197,500	117,743	2,500	1,276
Totals	4,588,200	$2,577,520	1,780,300	$1,081,492
Waste and reclaimed rubber:				
To France	1,800	$219	2,400	$286

IMPORTS AND EXPORTS OF RUBBER AND GUTTA AT SINGAPORE.*

IMPORTS.

August, 1916.

From—	Para Rubber.	Para Rubber for Treatment.	Borneo Rubber.	Gutta Percha.	Gutta Jelutong.
Malay Peninsula—					
Port Swettenham..*pounds*	1,168,933	14,800	.....	.....	.....
Teluk Anson	832,000	7,600	.....	.....	.....
Muar	504,800	4,533	.....	.....	.....
Malacca	379,633	433,466	.....	.....	.....
Penang	290,266	2,266	.....	.....	.....
Kelantan	245,733	7,733	.....	.....	.....
Port Dickson	76,933	86,400	.....	.....	.....
Kuantan	37,866	.....	.....	.....	.....
Rengat	13,866	.....	.....	.....	.....
Mersing	532	.....	.....	.....	.....
S. Pandjang	532	.....	.....	.....	.....
Totals	3,551,094	556,798	.....	.....	.....
Borneo—					
Sarawak	69,600	13,466	1,733	4,533	354,933
Pontianak	60,033	4,400	3,466	8,266	3,333
Bandjermassin	28,800	30,133	.....	4,000	48,000
Sambas	20,533	.....	.....	666	13,333
Labuan	19,670	1,200	.....	.....	108,400
Sibu	19,466	.....	800	4,000	45,733
Jesselton	14,800	101,466	133	1,733	.....
Passir	10,133	.....	.....	.....	.....
Sandakan	8,000	19,466	666	.....	.....
Kudat	6,368	6,933	.....	133	.....
Singkawang	400	.....	.....	.....	.....
Samarinda	266	.....	1,066	2,000	.....
Totals	257,999	177,064	7,864	25,331	573,732
Sumatra—					
Djambi	197,866	.....	.....	800	.....
Deli	87,600	327,600	.....	.....	.....
Belawan	34,133	.....	.....	.....	.....
Indraghiri	9,466	17,333	.....	.....	17,600
Asahan	7,466	80,666	.....	.....	.....
Siak	6,666	1,600	.....	.....	.....
Palembang	5,866	.....	.....	.....	52,800
Muntok	3,333	.....	.....	.....	.....
Bengkalis	933	.....	.....	.....	.....
Totals	353,329	427,199	.....	800	70,400
Java—					
Sourabaya	82,133	.....	.....	.....	.....
Batavia	43,066	.....	.....	.....	.....
Totals	125,199	.....	.....	.....	.....
Siam—					
Bangkok	800	.....	.....	.....	.....
Patani	133	.....	.....	.....	.....
Totals	933	.....	.....	.....	.....
Other Ports	201,533	204,870	4,933	13,600	37,333
Grand Totals	4,490,087	1,365,931	12,797	39,731	681,465

EXPORTS.

August, 1916.

To—	Para Rubber.	Para Rubber Transhipped.	Borneo Rubber.	Gutta Percha.	Gutta Jelutong.
NORTH AMERICA:					
United States—					
Akron ..... *pounds*	1,244,000	.....	.....	.....	.....
New York	882,800	104,666	.....	112,933	259,066
Seattle	842,133	18,133	.....	.....	31,600
San Francisco	11,200	6,666	.....	.....	25,200
Boston	8,933	.....	.....	.....	.....
Canada—					
Ontario (Toronto)	51,600	.....	.....	.....	.....
Totals	3,040,666	129,465	.....	112,933	315,866
EUROPE:					
United Kingdom—					
England—					
London	573,333	1,320,000	.....	324,266	22,933
Liverpool	245,200	239,200	.....	127,066	132,400
Russia (Vladivostok)	865,066	.....	.....	.....	.....
France (Marseilles)	22,400	.....	.....	.....	.....
Totals	1,705,999	1,559,200	.....	451,332	155,333
Grand Totals	4,746,665	1,688,665	.....	564,265	471,199

*Not complete. Imports and Exports from August 4 to August 11, inclusive, not received at this office.

RUBBER STATISTICS FOR CANADA.

IMPORTS OF CRUDE AND MANUFACTURED RUBBER.

UNMANUFACTURED—*free:*	July, 1916. Pounds.	July, 1916. Value.	Four Months Ending July, 1916. Pounds.	Four Months Ending July, 1916. Value.
Rubber and gutta percha, crude caoutchouc or india rubber:				
From Great Britain	156,672	$104,001	1,447,319	$1,028,207
United States	247,701	132,251	1,307,851	793.041
Straits Settlements	.....	.....	33,849	21,607
Other countries	.....	.....	2,217	1,891
Totals	404,373	$236,252	2,791,236	$1,844,746
Rubber, re-covered:				
From Great Britain	11,479	$1,513	30,219	$5,123
United States	457,418	64,901	1,512,478	211,806
Totals	468,897	$66,414	1,542,697	$216,929

UNMANUFACTURED—*free:*	July, 1916. Pounds.	July, 1916. Value.	Two Months Ending July, 1916. Pounds.	Two Months Ending July, 1916. Value.
Hard rubber, in sheets and rods:				
From United States	5,372	$4,234	7,401	$5,947
Rubber substitute:				
From United States	50,417	$4,112	220,258	$18,736
Rubber, powdered, and rubber or gutta percha waste:				
From Great Britain	.....	.....	81,052	$5,274
United States	23,804	$3,082	421,340	31,459
Other countries	347	20	4,275	188
Totals	24,151	$3,102	506,667	$36,921
Rubber thread, not covered:				
From United States	3,695	$5,751	15,345	$23,582
Balata, crude:				
From United States	55	$30	4,774	$3,463
Chicle, crude:				
From United States	8,340	$2,727	165,689	$62,876
British Honduras	122,342	45,763	932,973	344,296
Mexico	196,633	97,987	196,794	98,077
Totals	327,315	$146,477	1,295,456	$505,249

MANUFACTURED—*dutiable:*	July, 1916. General Tariff. Value.	July, 1916. Preferential Tariff. Value.	Four Months Ending July, 1916. General Tariff. Value.	Four Months Ending July, 1916. Preferential Tariff. Value.
Waterproof clothing:				
From Great Britain	$127	$41,255	$147	$122,613
United States	29,171	.....	114,016	.....
Totals	$29,298	$41,255	$114,163	$122,613
Hose, lined with rubber:				
From Great Britain	.....	$155	.....	$155
United States	$6,708	.....	$34,385	.....
Totals	$6,708	$155	$34,385	$155
Mats and matting:				
From Great Britain	.....	$57	.....	$66
United States	$232	.....	$1,630	.....
Totals	$232	$57	$1,630	$66
Packing:				
From Great Britain	.....	$294	.....	$405
United States	$6,678	.....	$29,841	.....
Other countries	4	.....	4	.....
Totals	$6,682	$294	$29,845	$405
Tires of rubber for all vehicles:				
From Great Britain	$1,054	$2,585	$4,268	$9,269
United States	92,557	.....	366,365	.....
France	.....	.....	1,832	.....
Other countries	.....	.....	182	.....
Totals	$93,611	$2,585	$372,647	$9,269
***Rubber cement, and all other manufactures of india rubber and gutta percha, N. O. P.:**				
From Great Britain	.....	$20,071	$985	$89,246
United States	$64,298	.....	271,115	.....
Other countries	5	.....	406	.....
Totals	$64,303	$20,071	$272,506	$89,246
Hard rubber, in tubes:				
From United States	$733	.....	$1,656	.....
Boots and shoes:				
From Great Britain	.....	.....	.....	$936
United States	$5,480	.....	$31,427	.....
Totals	$5,480	.....	$31,427	$936
Belting:				
From Great Britain	.....	.....	.....	$247
United States	$3,897	.....	$15,539	.....
Totals	$3,897	.....	$15,539	$247
Webbing—over one inch wide:				
From Great Britain	.....	$1,384	$22	$4,489
United States	$21,794	.....	82,422	.....
Other countries	25	.....	25	.....
Totals	$21,819	$1,384	$82,469	$4,489

*In addition the imports of rubber cement and all manufactures of india rubber and gutta percha not otherwise provided for amounted to $29 from Great Britain and $1,163 from various countries for July; and $87 from Great Britain and $2,710 from various countries for the four months ending July, 1916, the values being at treaty rates.

EXPORTS OF DOMESTIC AND FOREIGN RUBBER GOODS.

MANUFACTURED—	July, 1916. Produce of Canada. Value.	July, 1916. Re-exports of foreign goods. Value.	Four Months Ending July, 1916. Produce of Canada. Value.	Four Months Ending July, 1916. Re-exports of foreign goods. Value.
Belting:				
To Newfoundland	$347	.....	$2,734	.....
Hose:				
To Great Britain	$5,150	.....	$112,656	.....
United States	.....	.....	1,335	$125
Newfoundland	332	.....	1,513	.....
Other countries	932	.....	3,751	.....
Totals	$6,614	.....	$119,255	$125
Boots and shoes:				
To Great Britain	$32,764	.....	$167,194	.....
United States	16	.....	87	$252
Newfoundland	1,193	.....	3,276	.....
Australia	4,390	.....	6,709	.....
New Zealand	2,699	.....	4,359	.....
Other countries	454	.....	3,629	.....
Totals	$41,516	.....	$185,254	$252
Clothing:				
To United States	.....	$41	.....	$57
Newfoundland	$428	.....	$578	.....
Totals	$428	$41	$578	$57
Tires:				
To Great Britain	$9,925	.....	$134,471	.....
United States	15,313	$27,657	45,541	$30,498
Newfoundland	473	.....	2,966	.....
Other countries	28,413	.....	83,916	.....
Totals	$54,124	$27,657	$266,894	$30,498
***Rubber waste:**				
To Great Britain	$5,058	.....	$14,078	.....
United States	8,456	.....	62,479	.....
Totals	$13,514	.....	$76,557	.....
All other mnfs., N. O. P.:				
To Great Britain	$3,739	.....	$26,675	.....
United States	249	$2,090	781	$3,538
Newfoundland	303	.....	1,150	.....
New Zealand	339	.....	343	.....
Other countries	265	.....	1,387	516
Totals	$4,895	$2,090	$30,336	$4,054
†Gum chicle:				
To United States	$174,342	.....	$541,463	.....
Other countries	.....	.....	1,704	.....
Totals	$174,342	.....	$543,167	.....

*During July 42,100 pounds of rubber waste was exported to Great Britain and 184,300 pounds to the United States; making a total of 117,200 pounds to Great Britain and 915,000 pounds to the United States for the four months ending July, 1916.

†During July 323,587 pounds of gum chicle was exported to the United States, and 2,250 pounds to various countries, and 965,579 pounds to the United States for the four months ending July, 1916.

RUBBER STATISTICS FOR ITALY.

IMPORTS OF CRUDE AND MANUFACTURED RUBBER.

UNMANUFACTURED—	Six Months Ending June, 1915. Pounds.	Six Months Ending June, 1915. Value.	Six Months Ending June, 1916. Pounds.	Six Months Ending June, 1916. Value.
India rubber and gutta percha —raw and reclaimed:				
From Great Britain	.....	.....	1,635,860	.....
Straits Settlements	1,848,000	.....	1,079,760	.....
African Fr. Colony	32,120	.....	6,380	.....
Belgian Congo	.....	.....	199,320	.....
Brazil	4,161,740	.....	3,064,160	.....
Other countries	275,660	.....	702,900	.....
Totals	6,317,520	$4,433,750	6,688,380	$4,729,118
Rubber scrap	631,620	49,859	3,818,100	301,556
MANUFACTURED—				
India rubber and gutta percha —threads:				
From United States	16,060	.....	31,900	.....
Great Britain	16,060	.....	15,620	.....
Other countries	1,760	.....	3,740	.....
Totals	33,880	$59,444	51,260	$89,938
India rubber and gutta percha —sheets:				
Cut sheets	1,760	$2,625	1,980	$2,953
Elastic fabric	3,300	1,303	220	87
Insulated wire	440	116	440	116
Hard rubber	7,040	4,941	27,060	18,991
India rubber and gutta percha —tubes:				
Cut sheets	880	$1,390	1,100	$1,737
Elastic fabric:				
From Austria-Hungary	880	.....	.....	.....
Germany	5,500	.....	.....	.....
Other countries	30,360	.....	4,620	.....
Totals	36,740	$19,339	4,620	$2,432
Other forms	2,200	$1,351	3,080	$1,891
Belting	38,940	$23,913	77,660	$47,690
Rubber coated fabrics...*pieces*	53,240	$65,388	71,060	$87,275
Other forms:				
From Great Britain	22,220	.....	25,080	.....
Other countries	1,100	.....	220	.....
Totals	23,320	$20,458	25,300	$22,195

	Six Months Ending June, 1915.		Six Months Ending June, 1916.	
Boots and shoes:—*pairs*	Pounds.	Value.	Pounds.	Value.
From United States	8,416	.....	15,070	.....
Austria-Hungary	1,531	.....	.....	.....
France	88	.....	10,282	.....
Germany	4,224	.....	.....	.....
Other countries	95	.....	139	.....
Totals	14,354	$13,842	25,491	$24,599
Elastic webbing:				
From Austria-Hungary	5,500	.....	.....	.....
France	9,900	.....	14,520	.....
Germany	26,840	.....	880	.....
Other countries	12,540	.....	15,620	.....
Totals	54,780	$72,085	31,020	$40,820
Elastic fabric—not specified:				
From Austria-Hungary	9,460	.....	.....	.....
France	7,040	.....	199,980	.....
Germany	15,180	.....	.....	.....
Great Britain	90,420	.....	80,300	.....
Other countries	4,180	.....	6,600	.....
Totals	126,280	$99,704	286,880	$226,505
Tires:				
From France	160,380	.....	367,620	.....
Germany	2,420	.....	.....	.....
Great Britain	135,080	.....	229,020	.....
Other countries	18,700	.....	22,220	.....
Totals	316,580	$555,454	618,860	$1,085,818
Other rubber manufactures:				
From United States	126,500	.....	891,660	.....
Austria-Hungary	13,640	.....	.....	.....
France	289,740	.....	767,580	.....
Germany	63,140	.....	.....	.....
Great Britain	341,440	.....	429,220	.....
Other countries	2,420	.....	880	.....
Totals	836,880	$587,338	2,089,340	$1,466,182
Total Imports	.....	$6,012,300	.....	$8,149,903

EXPORTS OF CRUDE AND MANUFACTURED RUBBER.

	Six Months Ending June, 1915.		Six Months Ending June, 1916.	
UNMANUFACTURED—	Pounds.	Value.	Pounds.	Value.
India rubber and gutta percha —raw and reclaimed	222,640	$53,838	639,320	$224,343
MANUFACTURED—				
India rubber and gutta percha —threads:				
To Germany	5,720	.....	.....	.....
Great Britain	.....	.....	1,760	.....
Argentina	2,420	.....	3,740	.....
Other countries	30,800	.....	22,000	.....
Totals	38,990	$68,322	27,500	$48,250
India rubber and gutta percha —sheets:				
Cut sheets	5,500	$8,202	3,080	$4,593
Elastic fabric	1,540	608	1,540	608
Insulated wire	1,100	289	660	174
Hard rubber	30,240	14,205	42,900	30,108
India rubber and gutta percha —tubes:				
Cut sheets	.....	.....	9,020	$14,243
Elastic fabric	52,800	$27,792	51,040	26,866
Other forms	32,780	20,130	78,540	48,231
Belting	1,980	1,216	1,540	946
Boots and shoes *pairs*	50	48	.....	.....
Elastic webbing:				
To France	880	.....	4,180	.....
Greece	26,620	.....	45,760	.....
Egypt	1,980	.....	13,860	.....
Argentina	27,280	.....	68,640	.....
Brazil	34,980	.....	55,440	.....
Cuba	19,580	.....	19,140	.....
Other countries	30,360	.....	102,960	.....
Totals	141,680	$186,438	309,980	$407,905
Elastic fabric—not specified:				
To Spain	660	.....	440	.....
Argentina	1,540	.....	14,080	.....
Brazil	.....	.....	220	.....
Uruguay	1,100	.....	1,760	.....
Other countries	2,200	.....	8,580	.....
Totals	5,500	$9,650	25,080	$44,004
Tires:				
To France	105,160	.....	102,080	.....
Great Britain	54,120	.....	2,805,880	.....
Switzerland	215,160	.....	66,220	.....
India and Ceylon	130,680	.....	272,800	.....
Australia	16,720	.....	57,860	.....
Argentina	394,460	.....	761,860	.....
Brazil	197,280	.....	448,580	.....
Other countries	2,165,680	.....	321,640	.....
Totals	3,279,760	$5,763,988	4,836,920	$8,487,596
Other rubber manufactures:				
To Great Britain	7,700	.....	32,780	.....
Switzerland	72,600	.....	12,980	.....
Argentina	48,620	.....	53,240	.....
Other countries	183,480	.....	121,220	.....
Totals	312,400	$219,248	220,220	$154,554
Total Exports	.....	$6,373,974	.....	$9,492,421

THE MARKET FOR RUBBER SCRAP.

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NEW YORK.

THE rubber scrap market has shown a tendency to gradually work upward in sympathy with the advancing position of crude rubber. The flurry caused by the German submarines along our coasts stiffened prices somewhat, and although the scare was of short duration, it added to the strength of the dealers' position.

The opinion that the reclaimers are doing a good business is supported by reports that the rubber mills are already busy on the regular fall and winter work. That the rubber scrap market will feel the result of this activity before long is the belief of the large dealers who are holding out for better prices, and in fact the small dealers are equally adverse to letting go their holdings at the present ruling prices. Purchases therefore have been usually of small volume and the general business has only been fair for the month and this particular period.

BOOTS AND SHOES.—These have been quiet and more or less unsettled during the month as the mills have not appeared to be greatly interested in the prevailing nominal quotation of 9½ cents delivered. The diversity of opinion as to the available stocks and supplies and the absence of marked activity has failed to establish set prices in this material.

AUTO TIRES.—If anything, the tire situation has developed a certain amount of strength in October. Toward the end of the month, activity was noticed particularly in mixed tires. Offers were made of 6¾ cents delivered, and sales at 6½ delivered were reported. G. & G. tires have been quiet and considered a dealers' proposition. Reclaimers are quoted as saying that at present price of 8½ cents for this grade works out at a loss to them.

INNER TUBES.—The tone of inner tubes has been a little stronger of late due to the rubber position, although activity has been lacking in all grades. Dealers are reported to be carrying comparatively limited stocks and delivered prices have ranged between 25 and 25½ cents.

MECHANICALS.—All grades have been inactive, but the indications for good fall business are encouraging. Hose has been particularly steady and prices throughout the entire list are practically unchanged.

London imports of waste and reclaimed rubber for September were 71,100 pounds; Liverpool, 61,500 pounds. Re-exports were: London, 1,800 pounds; Liverpool, 2,400 pounds. The September exports of waste and reclaimed rubber manufactures of the United Kingdom were: London, 539,300 pounds; Liverpool, 191,500 pounds.

NEW YORK QUOTATIONS FOR CARLOAD LOTS DELIVERED.

OCTOBER 28, 1916.

Prices subject to change without notice.

	Per Pound.	
Boots and shoes	$0.09½ @	
Trimmed arctics	.07½ @	
White tires, Goodrich and Goodyear	.08½ @	
Auto tires, standard white	.06¾ @	
standard mixed	.06½ @	
stripped, unguaranteed	.04½ @	
Auto peelings, No. 1	.09½ @	
No. 2	.08¼ @	
Inner tubes, No. 1	.25½ @	
No. 2	.11½ @	
red	.11½ @	
Irony tires	.02⅛ @	
Bicycle tires	.04½ @	
Solid tires	.05½ @	
White scrap, No. 1	.13½ @	.14
No. 2	.10 @	
Red scrap, No. 1	.10 @	.11
No. 2	.08 @	
Mixed black scrap, No. 1	.04¼ @	
No. 2	.04 @	
Rubber car springs	.04½ @	
Horse shoe pads	.04½ @	
Matting and packings	.01 @	
Garden hose	.01⅝ @	
Air brake hose	.05½ @	
Cotton fire hose	.02½ @	
Large hose	.01½ @	
Hard rubber scrap, No. 1, bright fracture	.25 @	
Battery jars (black compound)	.02½ @	
Insulated wire stripping	.03½ @	
Rubber heels	.03¾ @	

THE MARKET FOR COTTON AND OTHER FABRICS.

Copyright, 1916.

NEW YORK.

THE advance in cotton during the month just passed has recorded figures unprecedented since 1874. January quotations have touched 19.60 cents, practically realizing the prediction of a month ago, of 20 cent cotton, and now the bull side of the market is forecasting 25 cent cotton by January 1. The inclination to discount crop estimates and unfavorable weather reports from India, together with heavy local buying orders, are the prime factors in this movement.

The prevailing abnormal prices of American, as well as Sea Island and Egyptian cotton, would warrant the belief that these levels may not be long sustained, unless supported by a continuance of the unusual conditions now controlling the market.

SEA ISLAND COTTON. There has been an active demand both in the Charleston and Savannah markets, and prices have steadily advanced. By the middle of October it was difficult to buy any quantity at less than 40 cents for round lots. The buying has been general, on account of both Northern and Southern mills, as well as on speculation. On October 20 the crop in sight at all ports was 32,057 bales, against 19,678 bales last year. Fancy Georgias and Floridas were selling at 39½ to 40 cents.

EGYPTIAN COTTON. Mail advices from Alexandria under date of September 19, indicate a very excited market and violent price fluctuations due to lack of selling interest. Climatic conditions have improved and all the Delta districts are now engaged in the first picking, but the results are inferior to last year. The bolls of the second picking appear to have suffered considerably from the pink boll worm and the third picking will undoubtedly suffer from the same cause. Exports from Alexandria from August 1 to September 13, 1916, were 17,623 bales, of which Great Britain imported 13,114; the Continent 3,176; United States 1,133 and India and Japan 200 bales. For the same period last year the total exports were 48,520 bales, of which Great Britain imported 20,364 bales; the Continent 14,383; United States 12,748, and India and Japan 1,025 bales. On October 25, Brown Egyptian cotton was 39 cents and Sakelarides was 46 to 48 cents.

HOSE AND BELTING DUCK. The demand has been active in a firm market and prices have advanced 5 to 6 cents a pound during the month. The mills are sold into May and July next year, and are making regular deliveries on contracts. The labor situation is not so acute as with the northern mills and strikes have not seriously interfered with production.

SHEETINGS, OSNABURGS, ENAMELING DUCK AND DRILLS. Steady buying during the month resulted in rapidly advancing prices that show gains of 2 to 4 cents over quotations published a month ago. Sheetings that normally sell for 4½ cents are now selling for 9½ cents. The demand is of domestic origin and apparently devoid of speculative features. Under the present cotton market conditions, there is small prospect of lower prices.

TIRE FABRICS. The situation at present, concerning both buyer and seller, may be described as chaotic. While most of the largest consumers are protected by contracts, there are many buyers who are unable to secure necessary supplies, or definite assurances for the future. The seller is confronted with abnormal prices for raw material, moreover, a 25 per cent shrinkage in the production of tire fabrics is reported. The fabric mills are now confronted with trouble in obtaining sufficient yarn for their requirements and the difficulties surrounding the labor situation are rather worse than better.

Sea Island building fabric has advanced 5 to 10 cents the square yard, and Egyptians have gone up 15 to 20 cents. Sixteen months ago tire fabric was selling for 16 cents, to-day the same material is around 80 cents. The result will be greater demand for Peeler fabrics and increased sales of unguaranteed tires.

NEW YORK QUOTATIONS.

OCTOBER 25 1916.

Prices subject to change without notice.

Aeroplane and Balloon Fabrics:			
Wamsutta, S. A. I. L. No. 1, 40-inch.....*yard*	$0.32½	@	
No. 4, 38½-inch.....	.32½	@	
O/X B. 36-inch.....	.14¾	@	
Wool Stockinettes—52-inch:			
A—14-ounce .....*yard*	1.25	@	
B—14-ounce	1.50	@	
C—14-ounce	1.75	@	
Cotton Stockinettes—52-inch:			
D—14-ounce .....*yard*	.50	@	.55
E—11½-ounce	.42	@	.50
F—14-ounce	.55	@	.60
G— 8-ounce	.48	@	.50
H—11-ounce	.50	@	.55
I — 9-ounce	.42	@	.45
Colors—white, black, blue, brown.			
Tire Fabrics:			
17¼-ounce Sea Island, combed.....*square yard*	1.00	@	1.10
17¼-ounce Egyptian, combed.....	.90	@	1.00
17¼-ounce Egyptian, carded	.87	@	.97
17¼-ounce Peelers, carded	.60	@	.65
Sheeting:			
40-inch 2.35-yard .....*yard*	.15	@	
40-inch 2.50-yard	.14	@	
40-inch 2.70-yard	.13	@	
40-inch 2.85-yard	.12¼	@	
40-inch 3.15-yard	.12¼	@	
Osnaburgs:			
40-inch 2.25-yard .....*yard*	.15½	@	
40-inch 2.48-yard	.14½	@	
37½-in. 2.42-yard	.14¾	@	
Mechanical Ducks:			
Hose .....*pound*	.36	@	.37
Belting	.36	@	
Carriage Cloth Duck:			
38-inch 2.00-yard enameling duck.....*yard*	.18½	@	
38-inch 1.74-yard	.20½	@	
72-inch 16.66-ounce	.38½	@	
72-inch 17.21-ounce	.40	@	
Drills:			
38-inch 2.00-yard .....*yard*	.18	@	
40-inch 2.47-yard	.14¼	@	
52-inch 1.90-yard	.19	@	
52-inch 1.95-yard	.18½	@	
60-inch 1.52-yard	.24¼	@	
Yarns:			
Garden Hose, 12/2 cabled.....*pound*	.35	@	
Fire Hose 12/1	.33	@	
Imported Woolen Fabrics Specially Prepared for Rubberizing—Plain and Fancies:			
63-inch, 3¼ to 7½ ounces.....*square yard*	.38	@	1.55
36-inch, 2¾ to 5 ounces	.35	@	.85
Imported Plaid Lining (Union and Cotton):			
63-inch, 2 to 4 ounces .....*square yard*	.35	@	.75
36-inch, 2 to 4 ounces	.25	@	.50
Domestic Worsted Fabrics:			
36-inch, 4½ to 8 ounces.....*square yard*	.32½	@	.57½
Domestic Woven Plain Linings (Cotton):			
36-inch, 3¾ to 5 ounces .....*square yard*	.15½	@	.20
Raincoat Cloth (Cotton):			
Bombazine .....*yard*	.07¾	@	.08
Twills	.12	@	.18
Tweed	.25	@	.35
Tweed, printed	.07½	@	.15
Plaid	.08½	@	.10
Repp	.22½	@	.27
Burlaps:			
32—7½-ounce .....*100 yards*	6.30	@	
40—7½-ounce	7.35	@	
40—8-ounce	7.50	@	
40—10-ounce	8.35	@	
40—10½-ounce	8.50	@	
45—7½-ounce	8.00	@	
45—8-ounce	8.15	@	
48—10-ounce	11.00	@	

THE MARKET FOR CHEMICALS AND COMPOUNDING INGREDIENTS.

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NEW YORK.

CONSIDERABLE activity has characterized the rubber chemical market during October. Inquiry has been good and the demand quite up to normal, while prices, with a few exceptions, have undergone but little change since a month ago. The mills are now looking to their forward requirements and contracts are being written covering supplies for 1917.

ANTIMONY SULPHURET. There has been a steady demand for both crimson and golden antimony. Prices have remained practically the same as a month ago.

BARYTES. The demand has been good for all grades, with prices ruling at about the same level as last month. Export demand is reported to be increasing, which is confirmed by recent over-sea shipments. Foreign grades were comparatively scarce.

LITHARGE. This pigment has had a steady demand, due to the mills coming into the market for supplies. New contracts are being written and deliveries on old accounts are promptly called for. The firm prices ruling have been due to the steady position of the metal market.

LITHOPONE. The market for this material has been quiet but later in the month offers were freely made on spot and forward positions. Prices are about the same as a month ago. Contracts covering next year's requirements are now being placed.

ZINC OXIDE. The demand has increased and there is a steady call for deliveries on contracts. The producers are disposing of their output through contracts only, and the consuming trade is obliged to cover its requirements in this way. The new prices which went into effect October 1, cover a period of three months, so there will be no change until the first of the year.

DRY COLORS. Trade has been good, especially in red oxides, due to the tire demand that is at present extraordinary. Ultramarine blue has been well sold up, but recently supplies appear to be easier.

WHITING. The consumption of whiting continues steadily, with prices unchanged and firm. The difficulties in securing supplies of the raw material have greatly increased the cost of production, which accounts for the present steady price levels.

NEW YORK QUOTATIONS.

OCTOBER 28, 1916.

Subject to change without notice.

Acetone (drums)	lb.	Nominal	
Acid, acetic, 28 per cent. (bbls.)	lb.	$0.03¼ @	.03¾
creasylic (crude)	gal.	1.00 @	
glacial, 99 per cent (carboys)	lb.	.20 @	
muriatic, 20 degrees	lb.	.01¾ @	
nitric, 36 degrees	lb.	.06⅛ @	
sulphuric, 66 degrees	lb.	.01 @	
Alumina Pigment, No. 1 (sacks)	ton	16.00 @	
Aluminum Flake (carloads)	ton	20.00 @	22.00
Ammonium carbonate	lb.	.09½ @	.10½
Antimony, crimson, sulphuret of (casks)	lb.	.45 @	.55
crimson, "Mephisto" (casks)	lb.	.60 @	
golden, sulphuret of (casks)	lb.	.28 @	.35
golden, "Mephisto"	lb.	.30 @	
golden, sulphuret, States brand, 16-17 per cent.	lb.	.35 @	
Asbestine	ton	17.50 @	
Asbestos	ton	30.00 @	150.00
Asphaltum "G" Brilliant	lb.	.03 @	
Barium sulphate, precipitated	ton	130.00 @	
Barytes, pure white	ton	30.00 @	32.50
off color	ton	17.50 @	22.50
Basofor	ton	125.00 @	
Benzol, pure	gal.	.65 @	
Beta-Naphthol	lb.	1.10 @	
Black Hypo	lb.	.45 @	.75
Bone ash	lb.	None	
black	lb.	.04 @	.08
Cadmium tri-sulphate (f. o. b. London)	lb.	2.75 @	
sulphide, yellow	lb.	2.00 @	2.20
Cantella gum	lb.	.33 @	.38
Carbon, bisulphide (drums)	lb.	.05½ @	
black (cases)	lb.	.18 @	.20
tetrachloride (drums)	lb.	.18 @	
Caustic soda, 76 per cent.	lb.	.04¼ @	
Chalk, precipitated, extra light	lb.	.04½ @	.05¼
precipitated, heavy	lb.	.04 @	.05
China clay, domestic	lb.	.01½ @	
imported	lb.	.02½ @	
Chrome, green	lb.	.20 @	
yellow	lb.	.26 @	
Cotton linters	lb.	.06¾ @	
Fossil flour	lb.	.02¾ @	
Gas black	lb.	.18 @	.20
Gilsonite	ton	37.50 @	40.00
Glue, high grade	lb.	.30 @	
medium	lb.	.18 @	.20
low grade	lb.	.11 @	.16
Glycerine, C. P. (drums)	lb.	.52½ @	
Graphite, flake (400 pound bbl.)	lb.	.12 @	
powdered (400 pound bbl.)	lb.	.05 @	
Green oxide of chromium (casks)	lb.	.65 @	
Ground glass (fine)	lb.	.02½ @	
Indian red, reduced grades	lb.	.06 @	.07
pure	lb.	.07 @	.08½
Infusorial earth, powdered	ton	60.00 @	
bolted	ton	65.00 @	
Iron oxide, red, reduced grades	lb.	.03½ @	.04
red, pure, bright	lb.	.11 @	.12
Ivory, black	lb.	.20 @	.25
Lampblack	lb.	.05 @	
Lead, red oxide of	lb.	.09¾ @	
sublimed blue	lb.	.08⅝ @	
sublimed white	lb.	.08⅜ @	
white, basic carbonate	lb.	.08¾ @	
white, basic sulphate	lb.	.08⅜ @	
Lime, flour	lb.	.01½ @	.01½
Litharge	lb.	.09¾ @	.10
English	lb.	.12 @	.13½
sublimed	lb.	.09½ @	
Lithopone, domestic	lb.	.07½ @	
imported	lb.	Nominal	
Magnesia, carbonate	lb.	.12 @	
calcined, heavy	lb.	.11 @	
heavy, Thistle Brand	lb.	.14 @	
light	lb.	.30 @	
Magnesite, calcined, powdered	ton	35.00 @	39.00
Mica, powdered	lb.	.03½ @	.05½
Mineral rubber	lb.	.01 @	.02
"M. R. X."	ton	100.00 @	
"Genasco"	ton	36.50 @	
"L. M. R."	ton	50.00 @	
"Richmond Brand"	lb.	.03 @	
"No. 64 Brand"	ton	35.00 @	
"Refined Elaterite"	lb.	.05 @	
"Rubrax"	ton	35.00 @	
Naphtha, stove gasolene (steel bbls.)	gal.	.22 @	
66@68 degrees (steel bbls.)	gal.	.27 @	
68@70 degrees (steel bbls.)	gal.	.28 @	
V. M. & P. (steel bbls.)	gal.	.21 @	
Oil, aniline	lb.	.25 @	
corn, refined	cwt.	12.01 @	
linseed (bbl.)	gal.	.87 @	
palm	gal.	.10½ @	
paraffin	gal.	.17 @	
pine (cases)	gal.	.66 @	
rapeseed	gal.	1.00 @	1.05
rosin, heavy body	gal.	.38 @	
tar (cases)	gal.	.21½ @	
soluble aniline colors, yellow, orange, red, violet, blue, green	lb.	.10 @	.75
Orange mineral, domestic	lb.	.12 @	
Paragol (carloads)	cwt.	10.29 @	
Petrolatum	lb.	.06½ @	
Petroleum grease	lb.	.04¼ @	
Pine solvent		None	
Pine tar	bbl.	7.65 @	
Pitch, burgundy	lb.	.03¾ @	.05
coal tar	bbl.	4.50 @	
pine tar	lb.	.02 @	
Plaster of paris	lb.	1.50 @	1.70
Prussian blue	lb.	1.30 @	1.80
Pumice stone, powdered (bbls.)	lb.	.03 @	.04
Resin, Pontianak, refined	lb.	.22 @	
granulated	lb.	.15 @	
fused	lb.	None	
Resin (280 pound bbls.)	bbl.	6.00 @	7.75
Rotten stone, powdered	lb.	.02½ @	.04
Rubber black	lb.	.06 @	
Rubber substitute, black	lb.	.08 @	.11
white	lb.	.12½ @	.17
brown	lb.	.12½ @	.18
Rubhide		Nominal	
Shellac, fine orange	lb.	.33 @	.35
Soapstone, powdered	ton	12.00 @	15.00
Starch, corn, powdered	lb.	.04 @	
Sulphur chloride (drums)	lb.	.09 @	.09½
Sulphur, flour, velvet, brand (carloads)	cwt.	2.15 @	
Bergenport (250-pound bbls.)	cwt.	2.10 @	
Talc, American	ton	12.00 @	15.00
French	ton	25.00 @	35.00
Toluol, pure	gal.	3.50 @	
Tripolite earth, powdered	ton	60.00 @	
bolted	ton	65.00 @	
Turpentine, pure gum spirits	gal.	.46 @	
wood	gal.	.43 @	
Venice	gal.	.11 @	.12
Ultramarine blue	lb.	.15 @	.50
Vermilion, brilliant	lb.	1.00 @	1.25
Chinese	lb.	.95 @	1.00
English	lb.	1.50 @	1.60
Wax, beeswax, white	lb.	.45 @	.60
ceresin, white	lb.	.12 @	.20
carnauba	lb.	.26 @	.45
ozokerite, black	lb.	.60 @	
green	lb.	.80 @	
montan	lb.	.27½ @	.30
paraffin, refined, 118/120 m. p. (cases)	lb.	.06½ @	
123/125 m. p. (cases)	lb.	.07 @	
128/130 m. p. (cases)	lb.	.08 @	
133/136 m. p. (cases)	lb.	.09½ @	.12
crude, white, 117/119 m. p. (bbls.)	lb.	.05 @	
yellow, 124/126 m. p. (bbls.)	lb.	.05¾ @	
Whiting, Alba	cwt.	.65 @	.85
commercial	cwt.	.75 @	1.00
gilders	cwt.	.85 @	1.00
Paris, white, American	cwt.	.95 @	1.00
English cliffstone	cwt.	1.25 @	1.50
Wood pulp XXX (carloads)	ton	Nominal	
Yellow ochre (Satin)	lb.	.02¼ @	
India rubber	lb.	1.50 @	
Zinc oxide, American process, horsehead brand			
"special" f. o. b. factory	lb.	.10½ @	
"XX red" f. o. b. factory	lb.	.10 @	
French process, green seal, f. o. b. factory	lb.	.12¾ @	
red seal, f. o. b. factory	lb.	.12¼ @	
white seal, f. o. b. factory	lb.	.13⅛ @	
Zinc substitutes	lb.	.01¼ @	
Zinc sulphide, pure	lb.	.15 @	

COMPARATIVE NEW YORK PRICES OF RUBBER COMPOUNDING INGREDIENTS—CONTINUED.

FROM AUGUST, 1914, TO AUGUST, 1916.

	1916. August.	1916. July.	1916. April.	1916. January.	1915. October.	1915. July.	1915. April.	1915. January.	1914. August.
FILLERS.									
Chalk, English	Nominal	Nominal	Nominal	Nominal	Nominal	4.00@—	3.50@—	3.50@—	2.75@ 3.00
French	Nominal	Nominal	Nominal	Nominal	Nominal	Nominal	Nominal	Nominal	3.10@ 3.50
Clay, China, imported	18 @38	18 @38	12.50@20.00	11.00@16.00	16.00@24.00	16.00@24.00	14.00@16.00	14.00@16.00	14.00@16.00
domestic	12 @15	12 @15	10.00@12.00	8.00@ 9.00	8.00@ 9.00	8.00@ 9.00	8.00@ 9.00	8.00@ 9.00	8.00@ 9.00
Fuller's earth, powdered, per 100 lbs.	80 @ 1.05	80 @ 1.05	80 @ 1.05	80 @ 1.05	80 @ 1.05	80 @ 1.05	80 @85	80 @85	80 @85
Magnesite, calcined, powdered ton	39.00@35.00	39.00@35.00	39.00@35.00	30.00@35.00	30.00@35.00	30.00@35.00	30.00@35.00	30.00@35.00	30.00@35.00
Plaster of paris, lb.	1.50@ 1.70	1.50@ 1.70	1.50@ 1.70	1.50@ 1.70	1.50@ 1.70	1.50@ 1.70	1.50@ 1.70	1.50@ 1.70	1.50@ 1.70
Pumic stone, powdered, pure, lb.	3 @ 4	3 @ 4	2 @ 3	2 @ 3	2 @ 3	2 @ 3	1½ @ 2	1½ @ 2	1½ @ 3
Rotten stone, powdered, in barrels	2½ @ 4	2½ @ 4	2½ @ 4	2½ @ 4	2½ @ 4	2½ @ 4	2½ @ 4	2½ @ 4	2½ @ 4
Soapstone, powdered, bags, ton	10.00@12.50	10.00@12.50	10.00@12.50	10.00@12.00	10.00@12.00	10.00@12.00	10.00@12.00	10.00@12.00	10.00@12.00
Silex	12.00@40.00	12.00@40.00	12.00@40.00	12.00@40.00	12.00@40.00	12.00@40.00	12.00@40.00	12.00@40.00	12.00@40.00
Talc, American, ton	9.00@13.00	9.00@13.00	9.00@13.00	9.00@13.00	9.00@13.00	9.00@13.00	15.00@20.00	15.00@20.00	15.00@20.00
French	15 @22	15 @22	5.00@12.00	15.00@20.00	15.00@20.00	15.00@20.00	15.00@25.00	15.00@25.00	15.00@25.00
Italian	20 @35	20 @35	18.00@30.00	18.00@30.00	18.00@30.00	18.00@30.00	35.00@40.00	35.00@40.00	35.00@40.00
Whiting, commercial	70 @75	70 @75	60 @65	50 @55	50 @55	45 @50	45 @50	45 @50	45 @50
gilders'	80 @85	80 @85	70 @75	60 @65	60 @65	55 @65	55 @65	55 @65	55 @65
extra gilders'	85 @90	85 @90	75 @80	65 @70	65 @70	55 @68	55 @68	55 @68	55 @68
American paris white	85 @90	85 @90	75 @80	65 @70	70 @75	70 @75	70 @75	70 @75	70 @75
English cliffstone	1.00@ 1.50	1.00@ 1.50	1.00@ 1.50	75 @ 1.10	75 @ 1.10	75 @ 1.10	75 @ 1.10	75 @ 1.10	75 @ 1.10
WAXES.									
Beeswax, white, pure	40 @50	47 @55	47 @55	47 @55	47 @55	42 @45	40 @42	45 @55	47½ @50
yellow, refined	35 @40	36 @39	36 @39	36 @39	33 @37	31 @35	31 @35	30 @35	40 @41
Carnauba, flor	50 @52	50 @52	50 @52	45 @47	45 @47	45 @47	Nominal	50 @55	50 @51
No. 1	43 @44	44 @45	47 @49	38 @40	38 @40	38 @40	45 @50	45 @50	45 @46
No. 2, regular	38 @39	38 @40	40 @43	33 @35	33 @35	33 @35	40 @45	40 @45	42½ @43
Ceresin, yellow	10 @14	10 @14	10 @14	10 @14	10 @14	10 @25	10 @25	10 @25	12 @22
white	14 @16	14 @16	14 @16	14 @16	14 @16	15 @25	15 @25	15 @25	14 @28
Japan	14½ @15	15¾ @16	17 @18	13 @—	12¾ @13	11¾ @12	12¾ @15	10½ @11	11 @11¼
Montan, crude	*28 @30	*28 @30	*28 @30	*28 @30	*24 @26	22 @24	16 @18	9 @10	6¼ @ 7¼
bleached	— @33	— @33	— @33	— @35	33 @35	33 @35	Nominal	35 @40	24 @25
Ozokerite, crude, brown	45 @60	45 @60	45 @60	28 @40	28 @40	28 @40	28 @40	28 @40	21 @25
green	80 @90	80 @90	80 @90	*60 @75	*50 @60	32 @36	32 @36	32 @36	25 @30
refined, white	*75 @80	*75 @80	*75 @80	*55 @65	*55 @65	30 @40	30 @40	30 @40	25 @30
refined, yellow	*60 @65	*60 @65	*60 @65	*40 @45	*40 @45	25 @30	25 @30	25 @30	25 @30
Paraffin, crude, 103@105 degrees	4 @ 4½	4 @ 4½	3¾ @ 4	3½ @ 3½	— @—	— @—	— @—	— @—	— @—
118@120 degrees	5 @—	5 @—	5 @—	3½ @ 4	2½ @ 3	2½ @ 3	2½ @ 3	3¼ @ 3¼	3¼ @ 3¼
refined, domestic, 118@120 degrees	6½ @ 7	6½ @ 7	6 @—	3¾ @ 4¼	4¼ @ 4¾	4½ @ 4¾	4½ @ 4¾	4½ @ 4¾	4¼ @ 4¾
125 degrees	7½ @—	7½ @—	7 @—	4 @ 4½	4¾ @ 5	4¾ @ 5	4¾ @ 5	4¾ @ 5	4¾ @ 5
128 degrees	8½ @ 9	8½ @ 9	7½ @—	4¾ @ 5	5¼ @ 5½	5½ @ 5½	5½ @ 5½	5¼ @ 5½	5¼ @ 5½
133@135 degrees	9½ @12	9½ @12	9 @ 9½	6 @ 6½	6¼ @ 6½	6¼ @ 6½	6¼ @ 6½	6¼ @ 6½	6¼ @ 6½
VEGETABLE OILS.									
Linseed, raw, car lots, gallons	72 @—	63 @—	76 @—	66 @—	55 @—	54 @—	58 @—	48 @—	59 @—
boiled, car lots	73 @—	64 @—	77 @—	67 @—	56 @—	55 @—	59 @—	50 @—	60 @—
refined, car lots	76 @—	67 @—	80 @—	69 @—	58 @—	57 @—	61 @—	52 @—	62 @—
Cottonseed, yellow, summer, prime	9¼ @—	10¾ @10⅞	10½ @—	8.50@ 8.60	6.91@ 7.20	6½ @ 6½	6½ @ 6⅝	5¾ @ 6	6½ @ 6¾
white, summer	9½ @10	11 @11½	10½ @11½	8¾ @—	— @—	6¼ @ 6¾	7 @ 7½	6 @ 7	7 @ 7½
Olive, denatured, gallon	88 @90	86 @90	95 @97	92 @94	85 @89	86 @88	90 @95	95 @ 1.10	78 @82
foots	9 @10	10 @10½	13¾ @14¼	9½ @10	8 @ 8¼	8½ @ 8¾	8¾ @ 9	9¼ @10	7¼ @ 7½
Palm, Lagos, spot	10 @10½	*11 @12	20 @22	9¼ @ 9¾	6¾ @ 6⅞	7 @ 7¼	11½ @12	7½ @ 7½	7 @ 7¼
commercial, spot	9½ @10	*10 @11	15 @16	8¾ @ 9	6½ @ 6½	6¾ @ 7	11½ @11½	6¾ @ 7	6¾ @ 7
prime, red, spot	9½ @10	*10 @11	17 @18	8¾ @ 9	6½ @ 6⅝	6¾ @ 7	10¾ @11¼	6¾ @ 7	6½ @ 6¾
Corn oil, crude, in barrels	7.75@ 7.80	8.41@ 8.51	*10.25@10.50	7.85@ 7.90	6.45@ 6.55	5.86@ 5.91	6.26@ 6.41	5.70@ 5.75	6.35@ 6.40
refined, in barrels	8.91@ 8.96	10.41@10.46	*11.11@11.16	8.45@ 8.50	7.15@ 7.20	6.35@ 6.40	7.25@ 7.30	— @—	Nominal
Pine oil, white, steam	— @—	— @—	— @—	— @55	— @56	36 @38	34 @36	34 @36	34 @38
yellow, steam	65 @70	52 @60	50 @60	— @50	— @50	34 @36	30 @33	30 @33	32 @35
Tar oil, general distilled	40 @—	30 @31	30 @31	30 @31	30 @31	30 @31	30 @31	30 @31	30 @31
commercial	25 @—	— @20	— @20	20 @22	20 @22	20 @22	18 @20	18 @20	18 @20
Rosin oil, 1st rectified	— @38	— @30	— @30	— @32	— @25	— @25	— @25	— @25	— @27
2d rectified	— @48	— @40	— @40	— @43	— @36	— @36	— @36	— @36	— @38
3d rectified	— @60	— @50	— @50	— @52	— @45	— @45	— @45	— @45	— @48
4th rectified	— @70	— @60	— @60	*— @62	— @55	— @55	— @55	— @55	— @60
Rape seed, in barrels, refined, French	— @—	— @—	— @—	1.05@ 1.07	96 @98	95 @ 1.00	— @—	— @—	74 @75
blown	94 @96	*1.00@ 1.05	*1.10@ 1.15	99 @ 1.00	81 @83	80 @81	87 @89	74 @76	63 @—
refined English	90 @92	*95 @ 1.00	*1.05@ 1.10	96 @97	77 @79	76 @77	85 @87	71 @73	59 @—
MISCELLANEOUS.									
Acetone	22½ @23	40 @42	45 @46	35 @40	30 @33	25 @27	21 @23	17 @20	10½ @11½
Ammonia, carbonate, domestic, lb.	9½ @10½	9½ @10½	9½ @10½	8½ @ 9¼	8½ @ 9½	8½ @ 9½	8¼ @ 9	8¼ @ 9	8 @ 8¼
powdered	11½ @—	10½ @11	10½ @11	9½ @10	9¼ @10	9½ @10	9½ @10	9¼ @10	8 @ 8¼
Aniline oil	37 @45	45 @50	90 @—	95 @ 1.10	95 @ 1.50	1.30@ 1.35	1.80@..	30 @40	10½ @11
Asphaltum, Gilsonite	36.00@50.00	36.00@50.00	36.00@50.00	36.00@50.00	36.00@50.00	36.00@50.00	36.00@50.00	36.00@50.00	36.00@50.00
Manjak	25.00@50.00	25.00@50.00	25.00@50.00	25.00@50.00	25.00@50.00	25.00@50.00	25.00@50.00	25.00@50.00	25.00@50.00
Benzol, pure, water white, gal.	60 @65	80 @85	90 @ 1.00	80 @90	85 @90	90 @ 1.00	1.00@—	— @—	— @—
90 per cent	65 @70	75 @—	90 @ 1.00	80 @90	85 @90	90 @ 1.00	1.00@—	— @—	— @—
Beta naphthol, gal	1.10@ 1.20	1.35@ 1.50	1.50@ 2.00	1.50@ 3.00	2.00@—	2.00@—	2.00@—	— @—	— @—
Burgundy pitch, domestic	4½ @ 5	4½ @ 5	3½ @ 5	3½ @ 5	4 @ 5	4 @ 5	7 @ 8	8 @ 9	4 @ 4¼
foreign	25 @—	25 @—	12 @14	10 @12	7 @ 8	7 @ 7½	— @—	— @—	— @—
Carbon, bisulphide	7 @ 8	8½ @ 9	6 @15	6 @15	6½ @ 7½	6½ @ 7¼	6½ @ 7½	7 @ 8	6½ @ 8
Chalk, precipitated, light, casks, lb.	4½ @ 5¼	4½ @ 5¼	4½ @ 5¼	4½ @ 5¼	4½ @ 5½	4½ @ 5½	4½ @ 5½	4½ @ 5½	4 @ 4½
heavy	3¾ @ 5	3¾ @ 5	3¾ @ 5	3¾ @ 5	3¾ @ 5	3¾ @ 5	3¾ @ 5	3¾ @ 5	3 @ 3½
Glycerine, C. P., in bulk, lb.	45 @46	50 @51	57 @58	52½ @55	*34½ @40	22 @22½	20 @—	22 @22½	19¾ @—
C. P., in cans	46 @47	51 @52	58 @59	53½ @56	*34½ @40	23 @23½	21 @—	23 @23¼	20¼ @—
Magnesia, carbonate	21 @23	19 @22	16 @17	14 @15	4¼ @ 5½	4¼ @ 5½	4¼ @ 5½	4½ @ 5¼	5½ @ 6
Petrolatum, bbls., light amber	3½ @ 4	3½ @ 4	3½ @ 4	3½ @ 4	3 @ 3½	3 @ 3½	3 @ 3½	3 @ 3½	3 @ 3½
Pitch, barrels, 200 pounds	4.00@—	3.50@ 4.00	3.50@—	3.50@—	3.00@ 3.50	3.00@ 3.50	3.00@ 3.50	3.75@ 4.00	3.75@ 4.00
Rosin, common to good, strained, 280 pounds	6.10@ 6.15	5.20@—	5.00@—	6.00@—	3.65@—	3.25@—	3.50@—	3.70@—	4.00@ 4.10
Spirits of turpentine	46 @—	42 @—	55 @—	56½ @—	41 @41½	43 @—	47½ @—	45½ @—	47½ @48
destructive distilled	38½ @39	38 @—	45 @—	42 @—	34 @37	31 @37	37 @—	36 @—	36 @38
wood, steam distilled	40½ @—	40 @—	51 @—	92 @—	39 @40	38 @—	43 @44	43 @44	42 @43
Starch, corn, pearl, cwt	2.55@ 2.61	2.25@ 2.31	2.25@ 2.36	2.05@ 2.16	2.15@ 2.26	2.35@ 2.46	2.15@ 2.26	1.99@ 2.10	2.09@ 2.20
potato, pound	5 @ 6½	5 @ 6½	6 @ 6½	5¼ @ 5½	5¼ @ 5½	5¼ @ 5½	5¼ @ 5½	5¼ @ 5½	5¼ @ 5½
Sulphur	5¼ @ 5½	5¼ @ 5½	5¼ @ 5½	5¼ @ 5½	5 @ 5¼	4¾ @ 6	3¾ @ 6	4¾ @ 6	4¾ @ 6
flour	2.10@ 2.50	2.10@ 2.50	2.10@ 2.50	2.00@ 2.40	2.00@ 2.40	2.00@ 2.40	2.00@ 2.40	2.00@ 2.40	2.00@ 2.40
Tar, kiln-burned	7.00@—	6.50@—	6.00@ 6.50	6.00@ 6.50	5.25@ 5.50	5.00@ 5.25	5.00@ 5.25	— @ 6.00	— @ 6.50
retort	7.00@—	7.00@—	6.00@ 6.50	6.00@ 6.50	5.25@ 5.50	5.25@ 5.50	5.25@ 5.50	— @ 6.00	— @ 6.50
Toluol, pure, gal	2.50@ 3.00	4.50@ 5.00	4.00@ 4.50	4.75@ 5.00	4.00@ 4.50	2.50@ 3.00	Nominal	— @—	— @—
90 per cent, gal	2.00@ 2.25	4.00@ 4.50	4.00@ 4.50	4.75@ 5.00	4.00@ 4.50	2.50@ 3.00	Nominal	— @—	— @—

*Nominal.

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